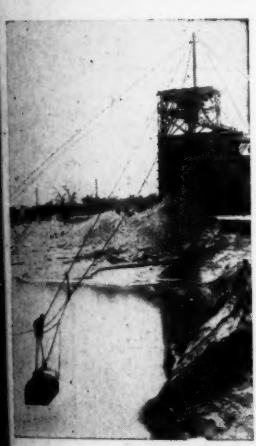
Pit and Quarry

SAND • GRAVEL • STONE

HANDLING • CRUSHING • SCREENING • WASHING

SAUERMAN

DRAGLINE CABLEWAY EXCAVATORS

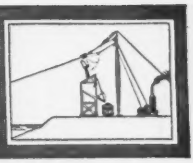


BY reason of its long reach, a Sauerman Dragline Cableway Excavator is able to dig to any depth and handle sand and gravel from pit to plant direct without the help of auxiliary conveying equipment.

The economy of this system of excavating and handling materials, whereby one machine takes the place of a combination of machinery, is fully explained in our 130-page catalog. A copy of this catalog is yours for the asking.

SAUERMAN BROS.
312 S. Dearborn Street, Chicago

-dig, convey, elevate & dump in one continuous movement under complete control of one man.



MAY 1920

Index to Advertisers - - - Page 45
Table of Contents - - - - Page 47
Power Plants Section - - Page 137

Gravel Washing

Sand and Gravel Plants

TO produce a washed product thoroly cleaned and screened to size you need S-A Equipment.

THERE are certain fundamental principles involved in S-A Gravel Plant design which insure superior results.

OUR engineers are glad to co-operate in the preparation of layouts for new projects and there is no charge for this service.

Stephens-Adamson Mfg. Company
Aurora, Illinois

AURORA S-A MFG.CO ILLINOIS

S-A MFG. CO. 5103

This Erie pays for itself every few months in wages saved. Owned by York Hill Trap Rock Quarry Co., Meriden, Conn.

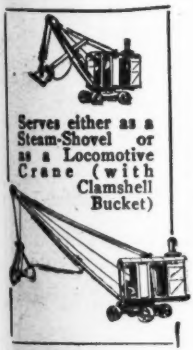
"Replacing 20 to 30 men; Sure of rock every day!"

"With one ERIE Shovel and 18 men, we are now getting the same output which formerly required 40 to 50 men.

"Besides this big saving in our payroll, we now have the assurance of a steady output every day."— *L. Suzio, President,* YORK HILL TRAP ROCK QUARRY CO., *Meriden, Conn.*, owners of 2 ERIES.

Even in a quarry which employs only 15 to 20 men, a good steam-shovel will usually save money. It's worth your while to figure excavating costs very carefully.

We would like to send you a Bulletin showing just what the ERIE Shovel can do. Write for a copy of Bulletin Q. Address



Serves either as a Steam-Shovel or as a Locomotive Crane (with Clamshell Bucket)

BALL ENGINE CO., Erie, Pa.
Builders of ERIE Steam Shovels and Locomotive Cranes.

ERIE Revolving Shovels BALL Engine Co. Erie, Pa.

They have *drilled* their way to *Success!*

HARDSOCG WONDER DRILLS

Faster drilling with less power and minimum upkeep are reasons for the increasing popularity of the WONDER DRILL.

A case in point: One of our customers recently advised us that he operated our drill from May 5th to December 22nd, last—a period of more than six months —without the slightest expenditure for upkeep or repairs.

Observe These Advantages:

The use of live air for operating the drill or cleaning drill hole of cuttings is controlled by one lever handle valve.

When in operation the piston hammer will not strike front end—thus eliminating breakages.

The lowest consumer of air of any drill made doing same amount of work. Fifty feet at 80 pounds pressure operates this drill successfully. Can you operate any other drill as economically?

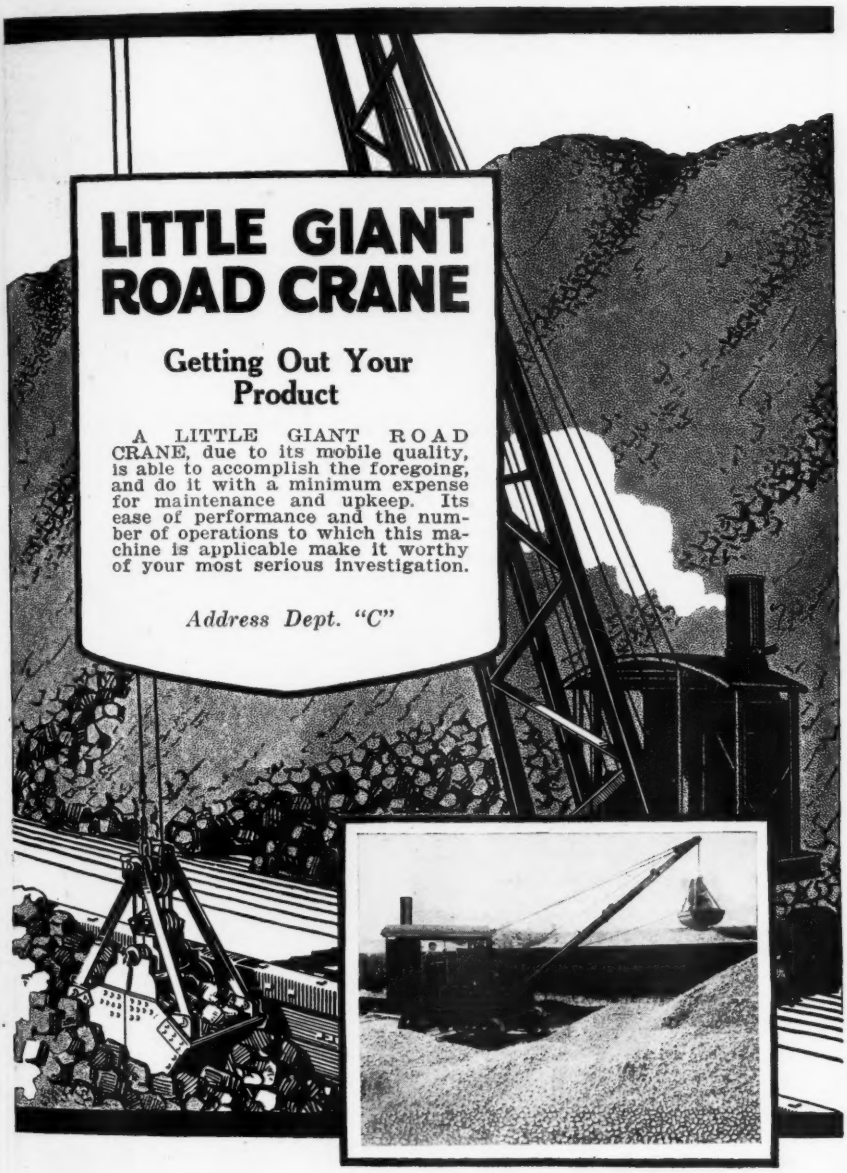
Fewest number of parts, and lowest cost of upkeep.

Skilled labor not necessary with this drill.

Write for Descriptive Bulletin

Hardsocg Wonder Drill Company

Ottumwa, Iowa



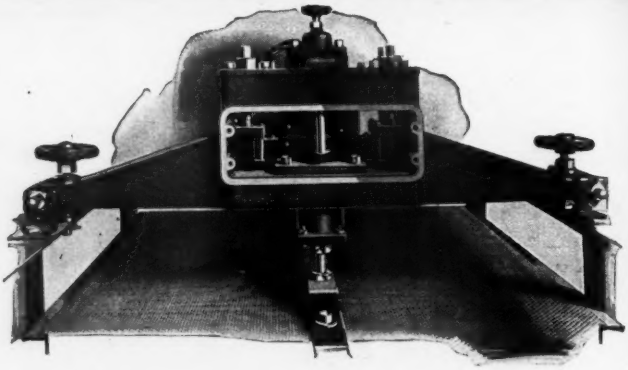
LITTLE GIANT ROAD CRANE

Getting Out Your Product

A LITTLE GIANT ROAD CRANE, due to its mobile quality, is able to accomplish the foregoing, and do it with a minimum expense for maintenance and upkeep. Its ease of performance and the number of operations to which this machine is applicable make it worthy of your most serious investigation.

Address Dept. "C"

The Locomotive Crane Company
OF AMERICA
CHAMPAIGN · ILLINOIS



Electro-Magnetic Vibration
applied to a
Drumhead Tension Screen

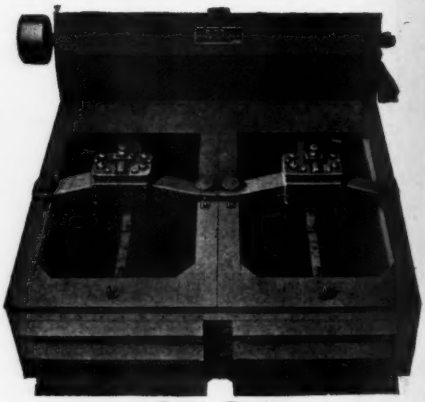
In applying electro-magnetic vibration directly to a taut, drumhead tension screening surface, the HUM-MER Separator has greatly increased the efficiency, economy and scope of screening.

With the HUM-MER electro-magnetic vibration, a fine screen can be vibrated as effectively as a coarse screen, and the intensity of the vibration can be adjusted to the requirements of any material.

In fact, many materials that **formerly could not be screened** through a wire cloth screening surface are easily and thoroughly separated by the HUM-MER.

Send us some of your own material for an actual demonstration of the increased tonnage and clean separation produced with the HUM-MER.

Full particulars upon request.



Patents Pending

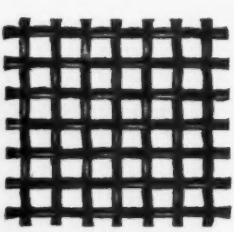
HUM-MER SEPARATOR

Screens All Granular Materials

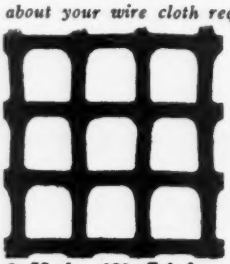
THE W. S. TYLER COMPANY

Manufacturers of Woven Wire Screens **Cleveland, Ohio**

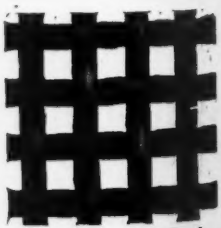
Write us about your wire cloth requirements.



6 Mesh, .054 Steel



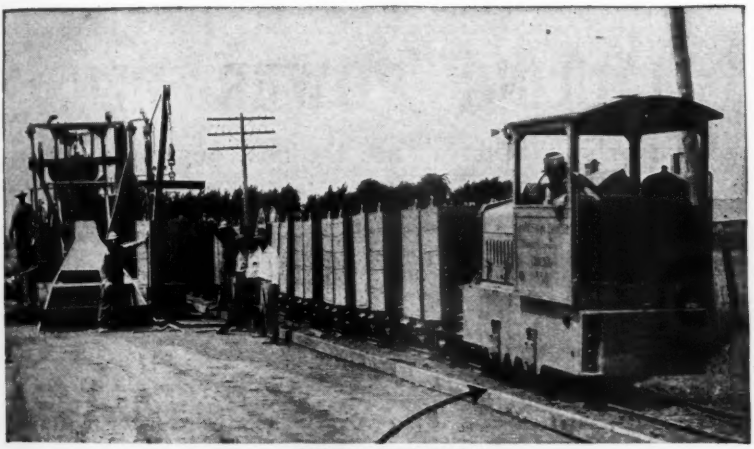
3 Mesh, .080 Galvd.



3½ Mesh, .135 Steel

WHITCOMB LOCOMOTIVES

ALL SIZES
FOR ALL CONDITIONS
POSITIVE GEAR AND FRICTION DRIVE
GASOLINE AND STORAGE BATTERY



SIX TON

3-Speed Positive Drive

Road Contractors Special

This Six-Ton Gasoline Locomotive Will High Ball More Material to the Mixer Than Any Other Gasoline Locomotive Built of Its Weight.

Gasoline Locomotives, 2½ to 25 Tons. Storage Battery Locomotives, 2 to 8 Tons on Drivewheels.

GEO. D. WHITCOMB CO.

ROCHELLE ILLINOIS

HAULING POWER PLUS

We believe "Shays" are the best engines made for quarry, pit and mill work.

They are rugged and sturdy in design and construction. Built for service under difficult railroad conditions.

Their three-cylinder power plant, flexible geared drive, and small driving wheels give them higher hauling power than rod engines of equal weight and the ability to operate successfully over rough track and steep grades where rod engines would be helpless.

One quarry company has over 70 "Shays" at work.

LIMA LOCOMOTIVE WORKS, Inc.

Lima, Ohio **30 Church St., New York**

VULCAN Locomotives

Size:— Standard 18-ton, 10x16, four driver, saddle tank, contractor's locomotive.

Load:— Fifteen 4-yard Western dump cars, well loaded with coarse sand. Weight of car, empty, about three tons. Weight of load in each car, about seven tons. Or a total of 150 tons for the fifteen cars.

Grades:— 2% and 2½%.

Figuring 20 lbs. frictional resistance, the tabled capacities of this size locomotive is 106 tons to start on a 2% grade or 89 tons to start on a 2½% grade. Whereas it is actually starting and hauling a load of 150 tons on these grades. (A locomotive efficiency of 141.5% and 168.5%, respectively.)

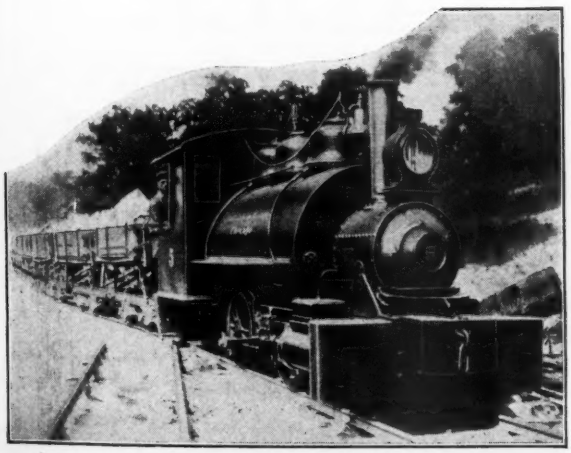
This is the regular load for these (three of this size are operated by the contractor who made this report) locomotives, working steadily every day on a 2¾-mile haul.

Another typical VULCAN Record.

VULCAN IRON WORKS

Designers and Builders of Locomotives

1754 Main St. **Wilkes-Barre, Pa.**



Note the Locomotives described above have been in service since 1912.

"Very Satisfactory"

is what Holbrook & Skinner say of

The BAY CITY LOADER

For Pit and Quarry Service

This machine is in operation loading gravel at their plant in Lansing, Mich. It is rendering excellent service and Mr. Skinner most willingly said so.

The BAY CITY Loader operates a powerful digging bucket that takes a big load at every bite. Handles a large amount of material at very low cost. Can be used for stripping, grading and loading sand, gravel or clay from bank into cars or wagons. Operating and upkeep costs small.

Write for full description.

BAY CITY DREDGE WORKS

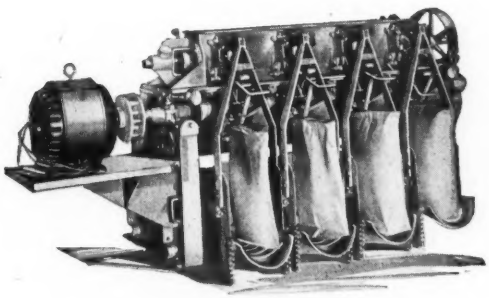
BAY CITY MICH.

SATISFIED STOCKHOLDERS—

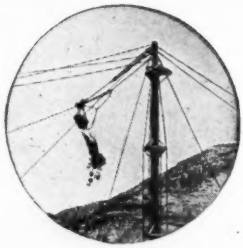
IN THESE DAYS, when the demand for hydrated lime is by far in excess of the tonnage manufactured, efficient, speedy packing methods are an imperative necessity; for the less time and labor are consumed in packing, the more will be available for manufacturing. Goods that are manufactured faster than they can be packed, must be stored—and surely this is no time to store hydrated lime.

The packing room is the "neck of the bottle." The Valve Bag Company's Packer and the Bates Valve Bags enlarge the "neck" thus encouraging greater production by providing adequate outlet through an efficient packing system. To increase production by faster, more accurate packing, means lower costs and greater profits.

That's how the "Packer" and the Bates Valve Bags make larger dividends and therefore — SATISFIED STOCKHOLDERS.



THE VALVE BAG COMPANY OF AMERICA
TOLEDO, OHIO



Where Endurance Means Economy

You men who operate sand and gravel handling equipment know what your wire rope has to contend with. Loads are heavy, bends are often sharp, and there is lots of wear.

You also know that when your wire rope fails your work stops. In fact the efficiency of your entire equipment depends upon your wire rope.

The unusual endurance and wear resisting ability of Hercules (Red-Strand) Wire Rope enable it to withstand a lot of hard service. It is a dependable rope because its every wire is rigidly examined and tested. Because of its uniform durability it will save you both time and money.

63 years in business

A. Leschen & Sons Rope Company

St. Louis, Mo.

New York Chicago Denver San Francisco

A. LESCHEN & SONS ROPE CO. ESTABLISHED 1857 ST. LOUIS, U.S.A.
"HERCULES" (RED STRAND) WIRE ROPE

The Truth

About the

Concrete Roofing Tile Business

It is true that there are big profits in the Concrete Roofing Tile Business.

For instance: If you were equipped to Manufacture Ohio Concrete ARTYLE today we could hand over to you just one of our many inquiries that would mean an order for 1,000,000 pices of tile.

On this order you could make 5½ cents profit for each separate piece—NET. Figure it out for yourself.

The Concrete Roofing Tile Business is BIG BUSINESS. Don't let anyone tell you that you can make it go on an investment of a few hundred dollars.

There are too many failures around the country now—small, insufficient, and imperfected machines discarded and standing idle because they couldn't fill the bill.

We tell you frankly that it is not safe to start in this business on an investment less than $15,000.00.

And to back it up we won't sell our machinery unless we are absolutely sure of the success of the people who want to buy.

The OHIO TILE MACHINERY Co

Manufacturers of ARTYLE Machinery

Willoughby, Ohio. (Near Cleveland)

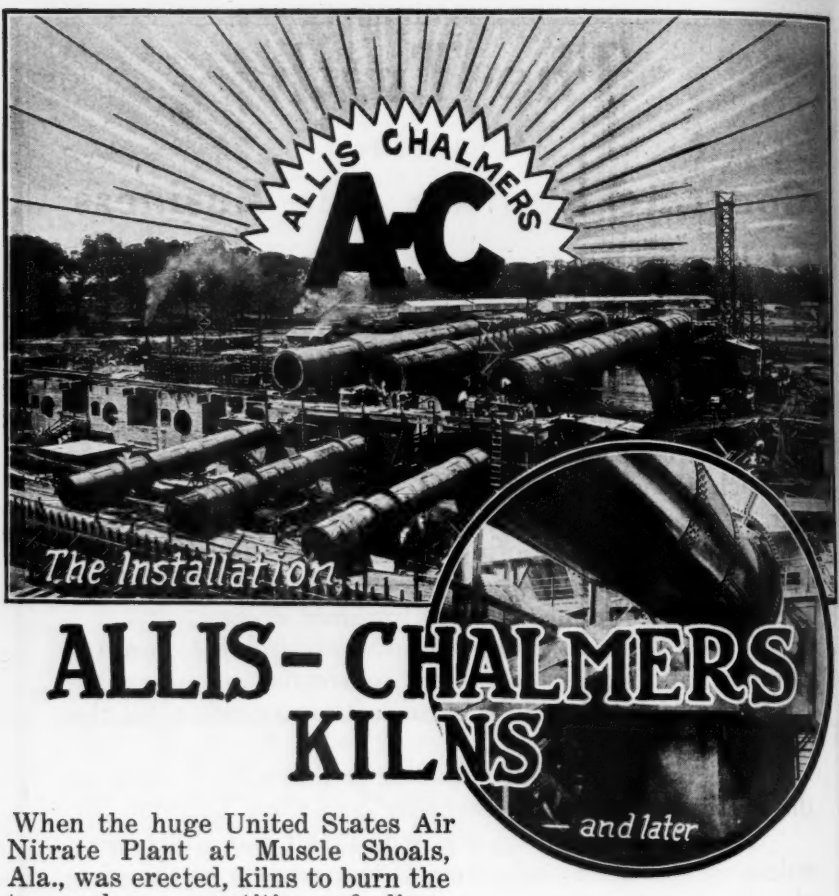
The Ohio Tile Machinery Company,
Willoughby, Ohio:

Kindly send me prices and information about Ohio Tile Machines.

Name .....

No. ..... Street

City .....State.....



ALLIS-CHALMERS KILNS

When the huge United States Air Nitrate Plant at Muscle Shoals, Ala., was erected, kilns to burn the tremendous quantities of limestone to be used, formed an important consideration.

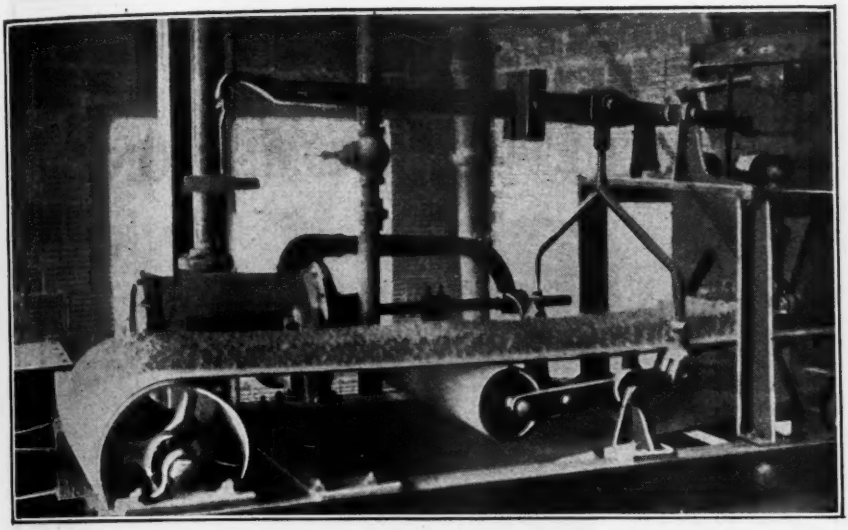
Accordingly a careful selection was made. Allis-Chalmers Kilns were part of the equipment, chosen by lime-producing experts.

Bear this choice in mind for future guidance: Whatever you need for your plant can best be supplied by the Allis-Chalmers organization. Reliable products, free from fantastic features that simply breed complications.

Tell us what equipment you are in need of.

Write to

ALLIS-CHALMERS MFG. CO. Milwaukee, Wis.



Successful Cement Manufacturers Use The SCHAFFER Poidometer

BECAUSE

It handles materials AUTOMATICALLY, doing the work of correctly proportioning by weight; adding proper proportions of liquid in wet process; operating with 99.50 per cent accuracy; keeps tab on production and wastage.

This outfit will handle a wide variety of materials, such as ground quick lime, limestone, hydrate lime, ground shales, coal, coke, ores, sawdust, zinc, fire clays, manganese, litharge, white lead, etc.

Can you afford to be without one?

The Schaffer Engineering & Equipment Co.

Peoples Bank Building **Pittsburgh, Pa.**

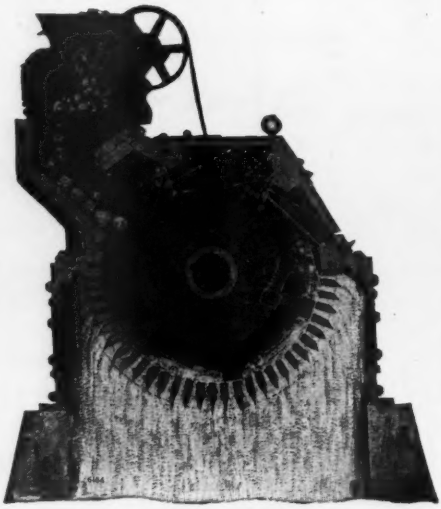
ESPECIALLY ADAPTED

For Making

AGRICULTURAL LIMESTONE

Note :

Grinding done in suspension leaving screen bar openings clear to give large capacity at less power.



Note :

Automatic Feed.

Reversible Double End Hammers.

Easy accessibility to screen bars and hammers for renewal.

Jeffrey TYPE "D"

Ball Bearing Pulverizers

are being installed by leading quarry operators for increasing their plant capacities to meet the constantly increasing demand for ground limestone.

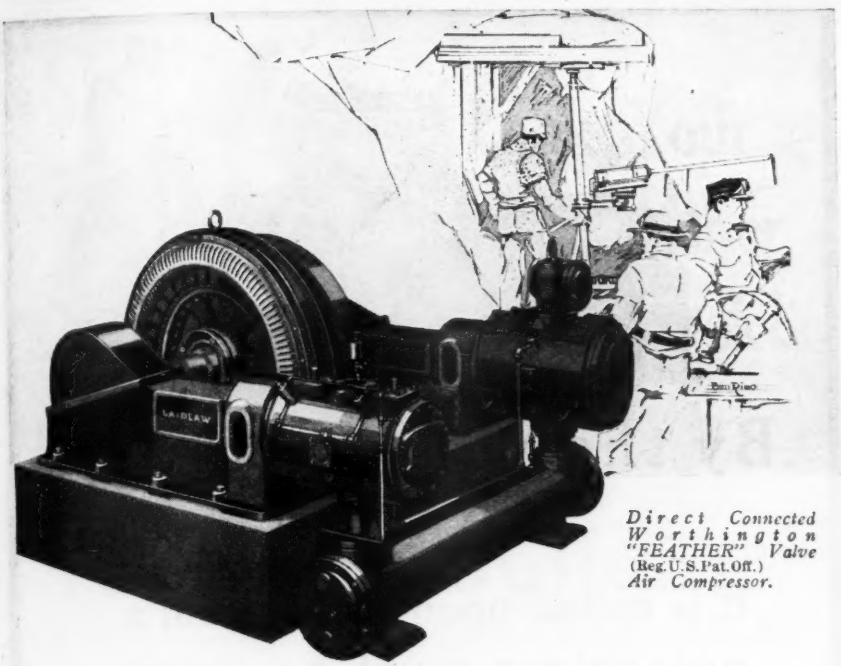
Complete information in Pulverizer Catalog No. 147-K.

The Jeffrey Mfg. Co. 990 North Fourth St. **Columbus, O.**

BRANCHES:

New York, Philadelphia, Pittsburgh, St. Louis, Dallas, Scranton, Montreal, Boston, Cleveland, Chicago, Birmingham, Milwaukee, Denver, Detroit, Seattle, Los Angeles

Manufacturers of Pulverizing, Conveying and Elevating Machinery; Chains; Buckets; Sprockets; Electric Trolley and Storage Battery Locomotives; Portable Loaders, etc.



Direct Connected Worthington "FEATHER" Valve (Reg. U.S. Pat. Off.) *Air Compressor.*

Why Worthington Salesmen Talk "FEATHER" Valve

(Reg. U.S. Pat. Off.)

THEY talk it because it is a distinctive Worthington creation. They talk it because it is the reason *why* Worthington Air Compressors are enabled to work through long stretches that would knock out the ordinary compressor valve.

This wonderful valve is a strip of ribbon steel that weighs less than one ounce, has but one moving part—itself—and functions without friction or hammering action. The valve strip seats tightly on ground face slotted seat and permits air or gas to pass by flexing against slotted curved guards; then gently straightens into place again. The valve ends are always in contact with seat, both when at rest and in action.

So always remember that Worthington Salesmen are serving your best interests when they sell "FEATHER" Valve to you, because (Reg. U.S. Pat. Off.) it frees air compressor service of a "weak sister" and in so doing saves you much time, nuisance and worry and expense.

And, too, the Worthington engineering staff is always at your service without expense or obligation—an organization with the prestige of 80 years' active business life behind it.

Other Worthington Products

Gyratory Crushers, Jaw Crushers, Air Compressors, Mine Pumps, Revolving Stone Screens, Ball and Tube Mills.

WORTHINGTON PUMP AND MACHINERY CORP.

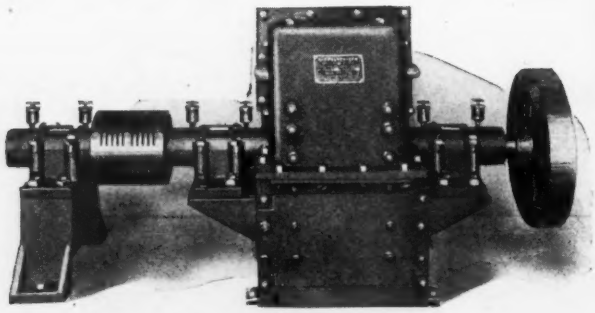
Executive Offices: 115 Broadway, New York City

Branch Offices in 24 Large Cities

PUMPS—COMPRESSORS—CONDENSERS—OIL & GAS ENGINES—METERS—MINING—ROCK CRUSHING & CEMENT MACHINERY

WORTHINGTON

Dunn Works, *Holyoke, Mass.*
Blake & Knowles Works, *East Cambridge, Mass.*
Worthington Works, *Harrison, N. J.*
Epping-Carpenter, *Pittsburgh, Pa.*
Laidlaw Works, *Cincinnati, Ohio.*
Gas Engine Works, *Cudahy, Wis.*
Power & Mining Works, *Cudahy, Wis.*
Snow-Holly Works, *Buffalo, N. Y.*



By the very nature of the Work

it is called upon to perform a pulverizer must be much stronger than the material it handles.

Only STEEL will stand the stress

"K-B"

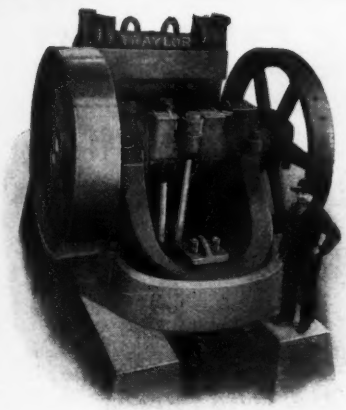
Is Built All-Steel

Catalog on request.

Trade K-B PULVERIZER Mark

K-B PULVERIZER COMPANY, Inc.

92 Lafayette Street, New York



Look Your Jaw Crusher In The Back!

If it's a

Traylor "Bulldog"

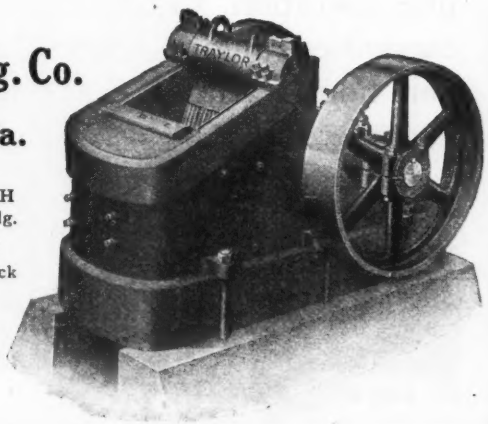
You'll see what's going on inside—what it is that eliminates 80% of the friction load and makes the "Bulldogs" the strongest, most economical, and most reliable jaw crushers on the market.

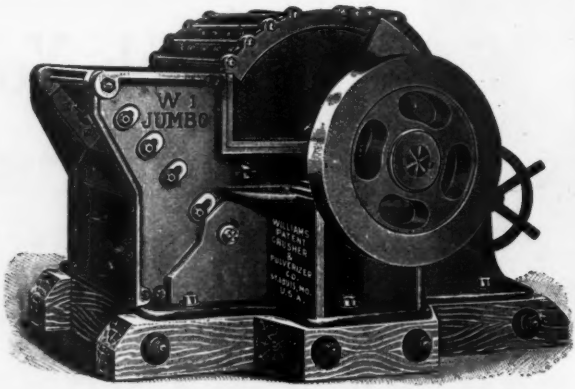
A lighter but far stronger pitman—a frictionless, self-aligning toggle system—a steel-banded frame of unequalled strength—these and other economy-producing "Bulldog" features are fully described in Bulletin QJX-1. Send for it.

Traylor Eng. & Mfg. Co.

Allentown, Pa.

NEW YORK 30 Church St.
PITTSBURGH 211 Fulton Bldg.
CHICAGO 1414 Fisher Bldg.
SPOKANE Mohawk Block
LOS ANGELES Citizens Bank Bldg.





WILLIAMS JUMBO CRUSHERS

Williams Jumbo Crushers are used in quarries as secondary crushers, taking 10-inch and under limestone, as it comes from the primary crushers, and reducing the material to 1½-inch, 1¼-inch or 1-inch and under in one operation. These machines are built in capacities ranging from 30 tons to 300 tons per hour. Many are now in operation. Complete details concerning these crushers are found in bulletin No. 85-A.

The Williams Patent Crusher & Pulverizer Company
General Sales Dept., 37 W. Van Buren St.,
CHICAGO

Plant
ST. LOUIS

67 Second St.
SAN FRANCISCO

TELSMITH—

The Crusher with the Big Feed Openings

The standards ordinarily employed in comparing coarse crushers are misleading. Breakers are usually bought according to width of receiving opening, ignoring the length of the feed openings, the bottom diameter and depth of the bowl, the area of concaves and head. And what engineer ever thought to measure the length of the crushing stroke at the top of the head? Yet all these elements are important in determining the capacity of a coarse crusher and the size of rock it will take.

For instance—here is a No. 7½ Telsmith Primary Breaker, with two 14 in.x70 in. feed openings. The crushing pinch at the top of the head is ¼ in. The top diameter of the concave circle is 57 in. The bottom diameter is 48 in. The crushing cone measures 29 in. (top diam.) by 44½ in. (bottom diam.) by 34 in. (height).

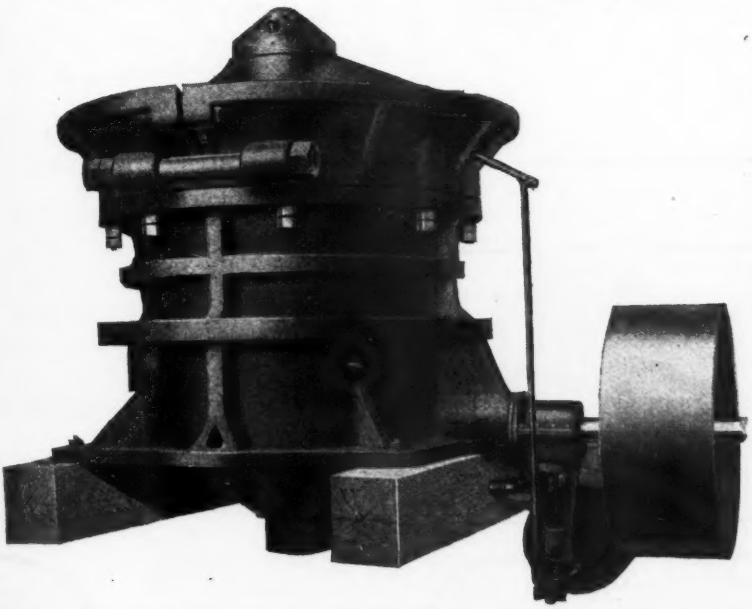
Contrast these measurements with a typical No. 7½ of lever-shaft design, having two 14 in.x52 in. feed openings. The crushing pinch at the top of the head is only about 3/16 in., when brand new. The top diameter of the concave circle is 49 in. The bottom diameter is 31 in. The crushing cone measures 22 in. x 31 in. x 34½ in.

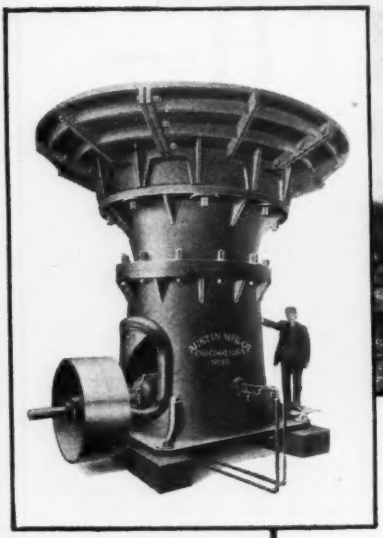
These two machines are commonly ranked as crushers of equal receiving area and capacity, merely because the receiving openings are of the same width. Need we emphasize further the fallacy of this practice?

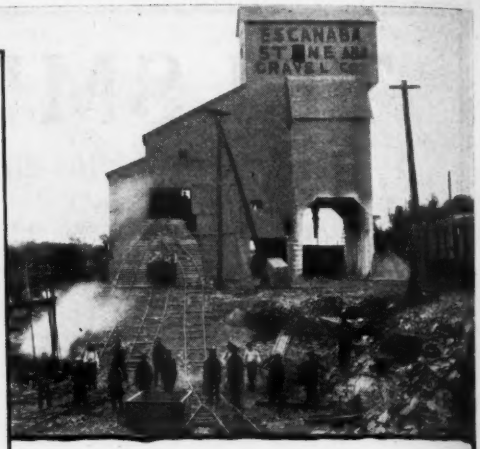
Glad to send your catalog No. 161 (Telsmith Primary Breaker) and Bulletin No. 2F15 (Telsmith Reduction Crusher).

SMITH ENGINEERING WORKS

3183 Locust St., Milwaukee, Wis.

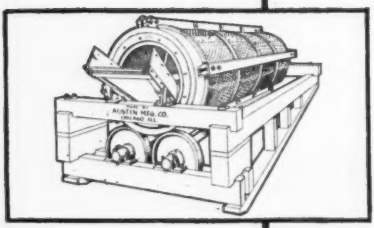




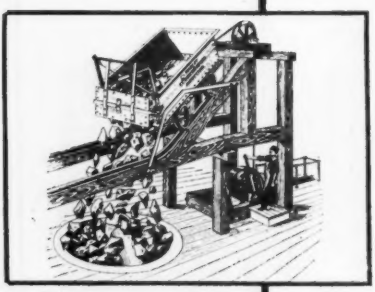


AUSTIN
Pit and Quarry Equipment

A complete line of crushing and rock handling equipment which invites your careful study. The more you study it, the more convinced you will become that Austin is the line for you to use.



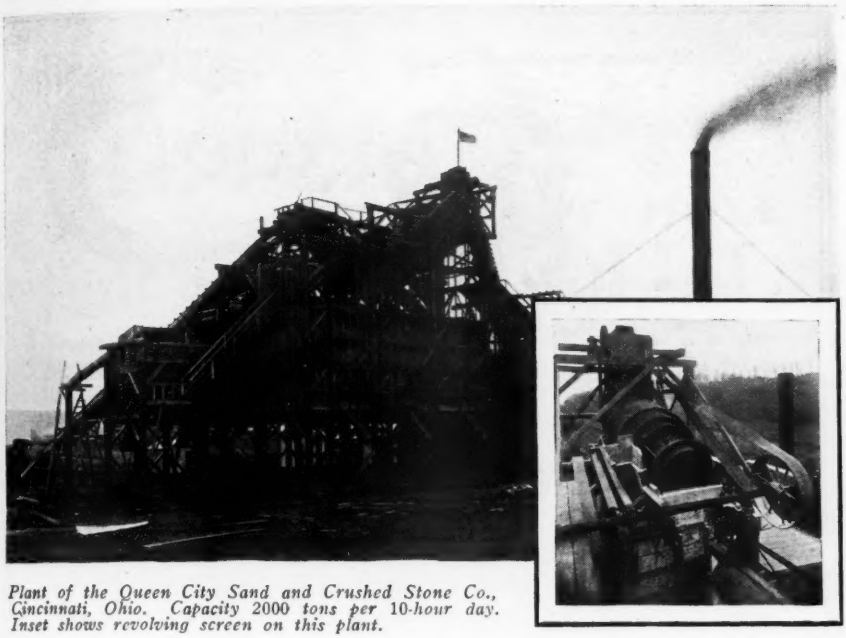
Austin Gyratory Crushers
Austin Revolving Screens
Austin Elevators
Austin End Dump Cars



Each with exclusive features making for greater profits—not merely talking points.

Write for Catalog 28 describing Austin Rock Crushing Equipment.

Austin Manufacturing Co.
CHICAGO
New York San Francisco



Plant of the Queen City Sand and Crushed Stone Co., Cincinnati, Ohio. Capacity 2000 tons per 10-hour day. Inset shows revolving screen on this plant.

Equipment—and Service

BRANCH OFFICES

Boston, Mass.
New York, N. Y.
Philadelphia, Pa.
Pittsburgh, Pa.
Atlanta, Ga.
Knoxville, Tenn.
Louisville, Ky.
Chicago, Ill.
Minneapolis, Minn.
Portland, Ore.
Kansas City, Mo.
Fort Wayne, Ind.
Muskogee, Okla.
Denver, Colo.
Billings, Mont.
Boise, Idaho.
San Francisco, Calif.
Los Angeles, Calif.

The basic machinery of sand and gravel excavating, elevating, conveying, crushing, screening and washing outfits is the most important consideration. Every piece of Good Roads equipment is manufactured in our own factories and represents many years of experience.

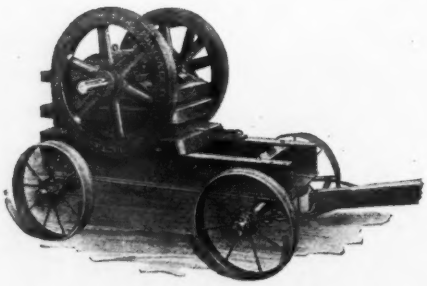
But we do not stop there. Our Engineers are at your service for the planning, building and installation of complete plants of any size for any purpose. We will gladly study your problem, offer suggestions, and submit estimates on any type of plant.

Write for catalog No. 5.

General Sales Offices

833 Bulletin Building **Philadelphia, Pa.**

The GOOD ROADS Machinery Co., Inc.



Road Building Boom Has Started

Illinois and Pennsylvania have voted bond issues of $60,000,000 and $50,000,000 respectively, for state-wide highway systems. Many other states are considering ways and means of voting similar issues—some even larger.

The Federal Government is urging all states to push plans for Federal Roads. Are you organized with the equipment to handle this rush that is sure to come?

GRUENDLER CRUSHERS

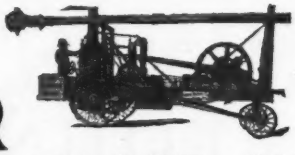
are the logical machines to supply the necessary aggregate to fill this demand. With a Gruendler, you can produce more crushed limestone or any other product with less power, in less time. They deliver service, unfailingly, economically, continuously.

They are simple, rugged, correct in design, give greater capacity per horsepower, last indefinitely and are practically free from interruption of operation. Write for bulletin and full particulars.

Gruendler Patent Crusher & Pulverizer Co.

987 North Main St. **St. Louis, U. S. A.**

THE CLIPPER



BLAST HOLE DRILL

The fact that the "CLIPPER" BLAST HOLE DRILL is used by the largest and best buyers of such machinery in the world is better proof of superiority than all the "big claim" advertisements that can be written in a month!

Among our hundreds of large customers, many of whom have bought from TEN to SEVENTEEN machines from us, we are proud to name the following:

If all these big concerns use the "CLIPPER" why not You?

Kelley Island Lime & Transport Co.
Mich. Limestone & Chemical Co.
Michigan Alkali Co.
France Stone Co.
Brownell Improvement Co.
Standard Lime & Stone Co.
Solvay Process Co.
Bethlehem Steel Co.
Jones & Laughlin Steel Co.
Lackawanna Steel Co.
Blair Limestone Co.
The Lehigh, The Alpha, The Atlas
The Alsen, The Coplay, The Vulcanite
The Whitehall, The LaSalle, and
The South-Western Portland Cement Companies
General Crushed Stone Co.
Tomkins Cove Stone Co.
Bessemer Limestone Co.
National Lime & Stone Co.
Greenville Stone & Gravel Co.
Lee Lime Co.
Ladd Lime & Stone Co.
A. T. Small Quarries Co.
W. W. Boxley Co.
Canada Cement Co.
Cornwall Ore Bank Co.
Connecticut Lime Co.
Dominion Mines & Quarries Co.
Ford Plate Glass Co.
Owens-Bottle Machine Co.
Toledo Stone & Glass Sand Co.
Derry Glass Sand Co.
Wayne Coal Co.
Adena Coal Co.
Danville Brick Co.
Lake Shore Shale Brick Co.

And hundreds of others of greater or less magnitude.

They are made for Steam, Gasoline, Compressed Air or Electric Power

The Loomis Machine Co.

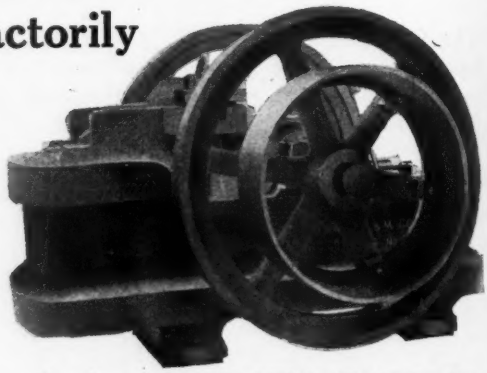
TIFFIN, OHIO

LEWISTOWN FOUNDRY PRODUCTS

Will satisfactorily meet your

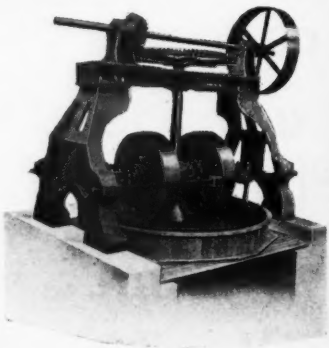
CRUSHING
GRINDING
SCREENING
WASHING
DRYING
ELEVATING

needs

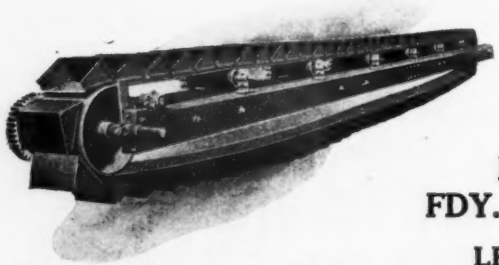


Lewistown Standard Blake Type Crusher

We manufacture a line of equipment for the above purposes in pit and quarry service and shall be pleased to furnish you with any desired information on whatever class of equipment you are interested in.



9-Foot Dry Pan



40-ft. Continuous Bucket Elevator

LEWISTOWN FDY. & MACHINE CO.

LEWISTOWN, PA.

Atlas Explosives

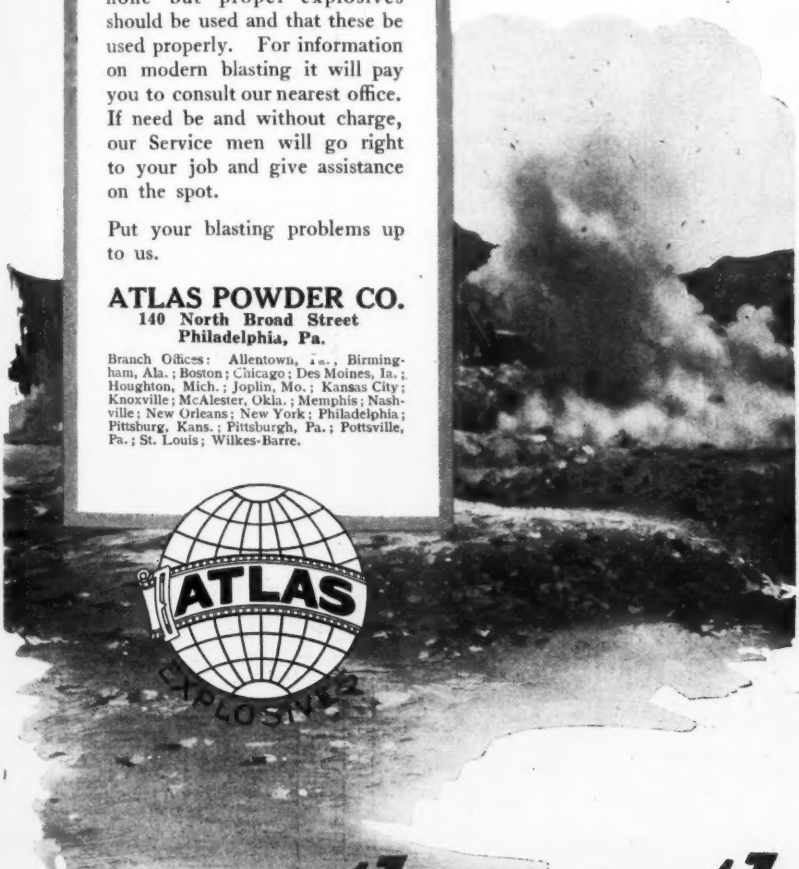
reduce the cost of stripping operations in quarry, mine and road construction work. There are ATLAS Blasting Powders and ATLAS High Explosives especially suited to the economical moving of earth.

More than a century of experience in the manufacture of explosives is at your command, since Atlas SERVICE is back of Atlas Explosives. Not only economy but safety requires that none but proper explosives should be used and that these be used properly. For information on modern blasting it will pay you to consult our nearest office. If need be and without charge, our Service men will go right to your job and give assistance on the spot.

Put your blasting problems up to us.

ATLAS POWDER CO.
140 North Broad Street
Philadelphia, Pa.

Branch Offices: Allentown, Pa., Birmingham, Ala.; Boston; Chicago; Des Moines, Ia.; Houghton, Mich.; Joplin, Mo.; Kansas City; Knoxville; McAlester, Okla.; Memphis; Nashville; New Orleans; New York; Philadelphia; Pittsburg, Kans.; Pittsburgh, Pa.; Pottsville, Pa.; St. Louis; Wilkes-Barre.



move the earth

Chemically Perfect Explosives Mean Perfect Blasting

Every shot you place, every blast you make, has a certain work to perform—a certain assigned quantity of material to carve out.

Your shots may be accurately placed and properly handled throughout.

But they will not do their assigned work

—unless the explosives used are chemically right;

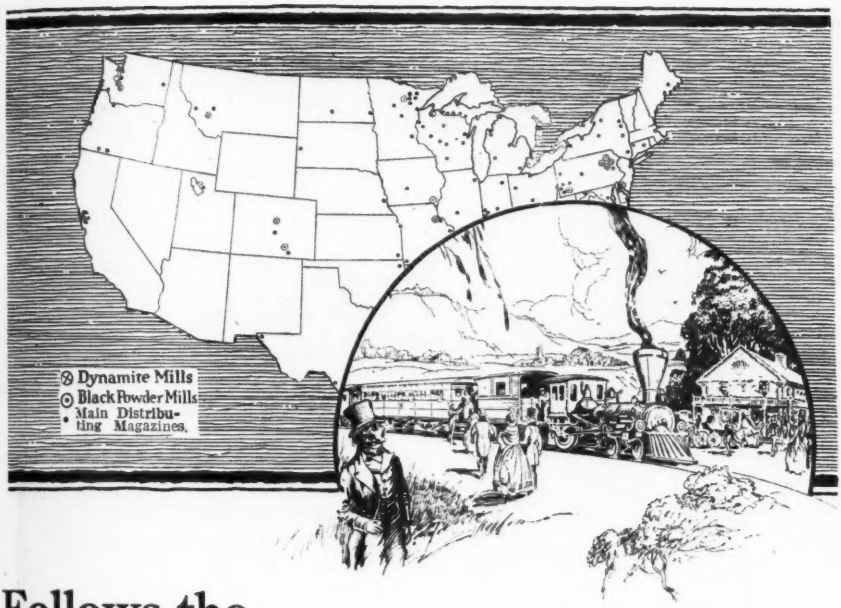
—unless the chemicals used in their manufacture are perfect by proof, best by test.

The Grasselli Powder Company uses only "Grasselli" Perfect Chemicals—made since 1839 by the master chemists of the Grasselli Chemical Company, America's oldest and largest chemical manufacturers.

Let "Grasselli" service experts help you solve your blasting problems. Years of experience in handling shots in pit and quarry operations, together with their superior knowledge of the actions of various grades of explosives places them in position to be of real service to you. Let them help you cut operating costs and increase your output. A letter or wire will bring one of them to your quarry.

The Grasselli Powder Co.
Cleveland, Ohio.

Du Pont Explosives Service —*Everywhere*



Follows the Demand—

In Reconstruction Days

IN Reconstruction Days during the late '60s and early '70s Du Pont Service went westward with the Nation's expansion, helping the first Great Transcontinental Railroads to clear and level their right-of-ways, mining the ore to make their equipment and the coal to run their engines.

The history of the Du Pont Organization has been closely tied up with the safety and industrial welfare of the country since 1802, until now it has come to be the greatest producer of explosives in the world. It operates 24 mills located at strategic points throughout the country together with a great number of magazines. One of these distributing points is near your work and the vast fund of knowledge of explosives we have gathered during the last 118 years is as near to you as your pen.

Tell us the requirements of your work. It is our business to recommend the type of explosive that will handle it most efficiently and at the lowest cost. Bring your difficult problems to us. Du Pont Service is effecting tremendous savings for our customers. It is yours for the asking.

DU PONT

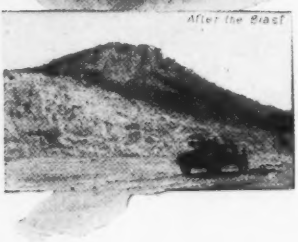
E. I. du Pont de Nemours & Company, Inc.

Sales Dept.: Explosives Division

WILMINGTON, DELAWARE

A large quarry blast made with Hercules Powder. 120,000 pounds of explosives were used.

Before the Blast



After the Blast

Put Hercules Dynamite On The Job

Quantity production and economy are important items in your day's work. And the explosives you use are largely responsible for your ability to meet the present heavy demand for quarry products.

Thousands of quarries where Hercules Powders are in use are producing at top speed and their profits are piling up every day.

HERCULES DYNAMITE

on *your* pay roll will increase *your* production and profits.

Every blasting problem in your quarry can be successfully solved with one or another of the many explosives made by the Hercules Powder Co. Your wide experience will doubtless enable you to be the best judge of the kind or grade most suitable for your needs but, if you think that we can help you in any way, our Service Department will be glad to make suggestions

Write the nearest branch office of

HERCULES POWDER CO.

Chicago	St. Louis	New York
Pittsburg, Kan.	Denver	Hazleton, Pa.
San Francisco	Salt Lake City	Joplin
Chattanooga	Pittsburgh, Pa.	Wilmington, Del.

Make Every Shot *COUNT!*

WITH production costs mounting higher and higher it is more essential than ever that you make every dollar's worth of explosives do a dollar's worth of work.

All doubt in this direction is set at rest when you use Aetna Explosives. They are manufactured from special formulas designed to give maximum disruptive power. Properly placed and fired, Aetna Explosives bring down the rock in profitable quantity—and shattered to the desired size.

Write for full particulars

Aetna Explosives Company, Inc.

165 Broadway, New York

BRANCHES

Birmingham, Ala.
Buffalo, N. Y.
Chicago, Ill.
Denver, Colo.
Duluth, Minn.
Joplin, Mo.
Louisville, Ky.
Norristown, Pa.
Pittsburgh, Pa.
Pottsville, Pa.
Roanoke, Va.
St. Louis, Mo.
Wilkesbarre, Pa.

AETNA

It does the work!

Specially Designed Belts for Conveying

SAND AND GRAVEL

The problem of conveying these two commodities should not be trusted to any except a strong, sturdy belt, specially built to withstand severe usage which is to be expected in handling sand, gravel, crushed rock, stone, cement and similar products.

DESERT CONVEYOR BELT

By its construction of extra heavy duck, strong friction and its thick, tough cover, it is the ideal belt for use in quarries, cement plants, washeries and other industries where hard, abrasive articles are conveyed.

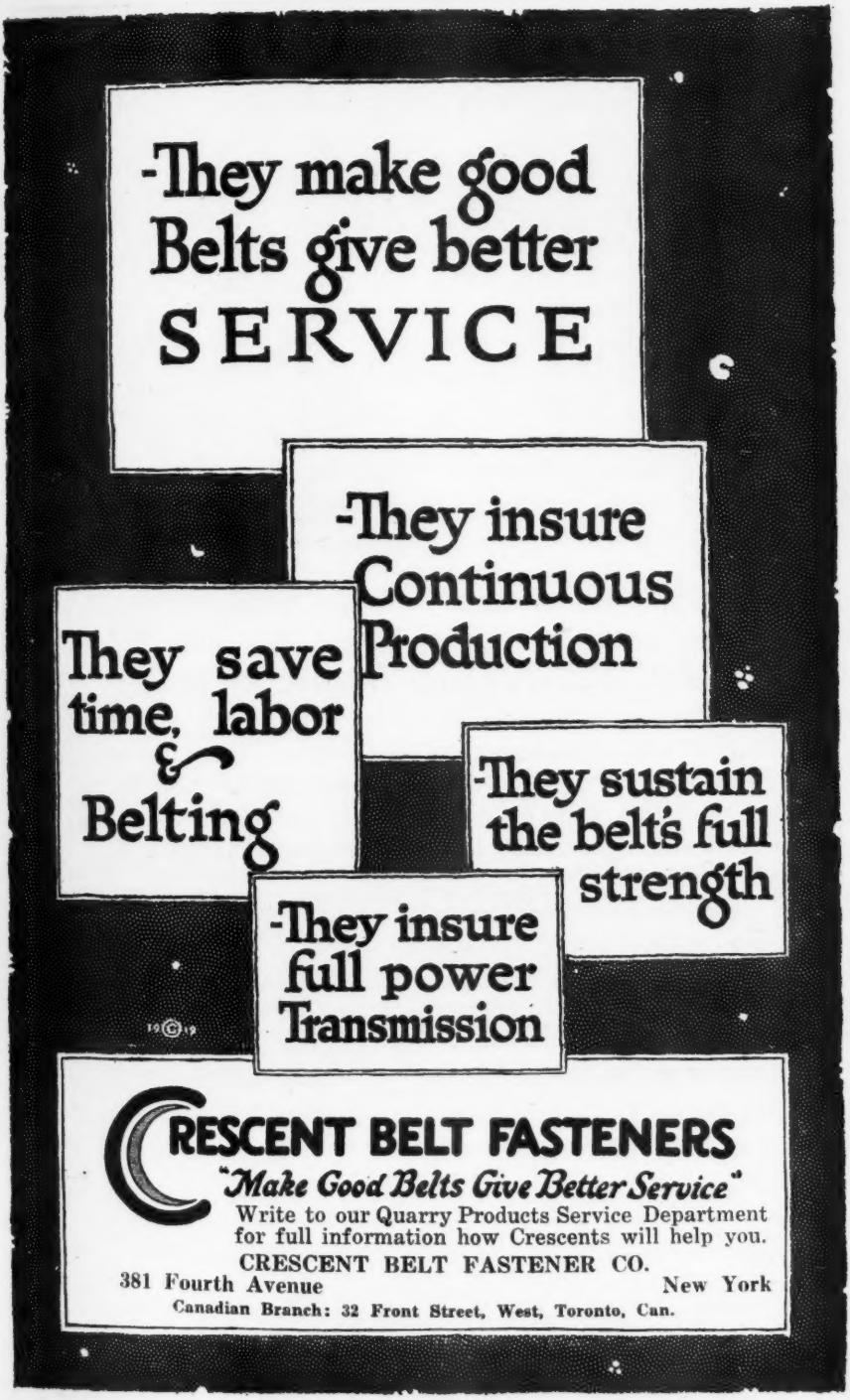
Our belting experts will gladly advise you with your Belting problems

QUAKER CITY RUBBER CO.

Manufacturers of Mechanical Rubber Goods

PHILADELPHIA 629 Market St. **CHICAGO** 182 W. Lake St. **PITTSBURGH** 211 Wood St.

NEW YORK, 53 Murray St.


-They make good Belts give better SERVICE
-They insure Continuous Production
They save time, labor & Belting
-They sustain the belt's full strength
-They insure full power Transmission
19©19
CRESCENT BELT FASTENERS
"Make Good Belts Give Better Service"
Write to our Quarry Products Service Department for full information how Crescents will help you.
CRESCENT BELT FASTENER CO.
381 Fourth Avenue New York
Canadian Branch: 32 Front Street, West, Toronto, Can.

Again B-G Leads!

It's a significant fact that every radical change or advance in Loader Construction is introduced by the Barber-Greene Company. The latest example of this is the adoption of the crawler type of traction to the New Model 20.

B-G Self-Feeding Bucket Loader

In addition to the crawlers there is the patented rotating disc feeder—another B-G feature. The only safe and dependable, yet flexible, feeder made. And these are but two of many B-G points of superiority. Write for booklet describing in detail the New Model 20.

B-G Conveyors

You cannot afford to overlook B-G Conveyors when selecting labor-saving equipment for your plant. Made in portable and stationary styles—all sizes and types—each with profit making features.

Let B-G Engineers study your material handling problems and work with you on them. This costs you nothing—no obligation. Get in touch with them today or write for Catalog N.

Barber-Greene Company
AURORA, ILLINOIS, U. S. A.

BRANCH SERVICE AND SALES OFFICES:

New York, Philadelphia, Norfolk, Salem, Hartford, Buffalo, Utica, Cleveland, Detroit, Indianapolis, Pittsburgh, Chicago, Milwaukee, Minneapolis, St. Louis, Omaha, Birmingham, Louisville, Kansas City, Denver, Salt Lake City, Portland, San Francisco, Los Angeles

Canadian Agents: Massey Limited, Montreal, Winnipeg, Toronto, Vancouver.

EXPORT DEPARTMENT
ALLIED MACHINERY COMPANY OF AMERICA

How the Blast Hole Drill Is the Hinge on Which All Stone Production Swings

The photograph above shows a part of the Taylorsville Dam Project of the Miami Conservancy. The two drills in the left foreground are Cyclone Electric Non-Traction Big Blast Hole Machines. Upon their successful and continuous operation the immense dragline, the locomotive and cars to the right are absolutely dependent. The latter equipment represents from fifty to sixty times greater first cost than the drilling machines discounting the many times greater operating costs.

In quarrying, blast-hole drilling represents the first step in the production of stone. The balance of the plant equipment, representing a total investment one hundred or more times the drill investment, hinge on this primary operation. A break-down at this point up-sets the whole production schedule.

It was for this reason that Cyclone Drills were purchased for the Miami Conservancy work and although only a comparatively small portion of the huge excavations required rock moving and big blast hole drilling, no deviation was made from the policy of the engineers in selecting only PROVEN equipment.

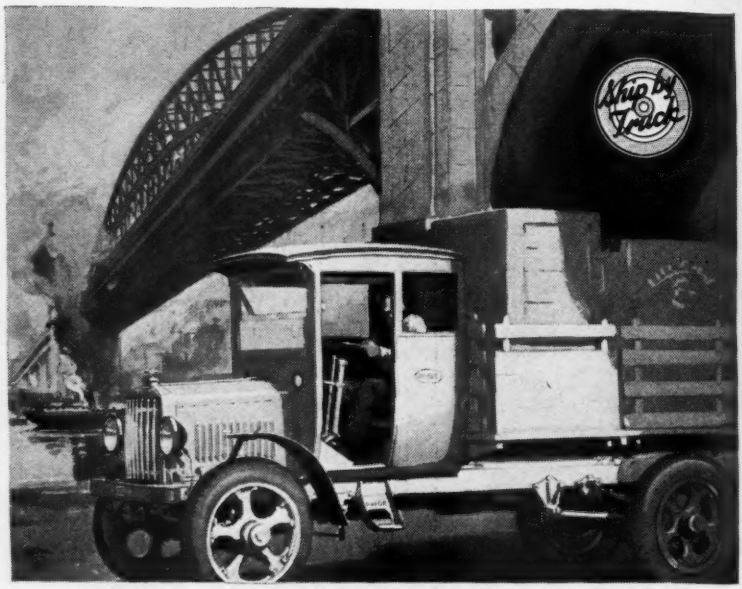
There is a size of Cyclone Blast Hole Drill to fit in with the production of every quarry or pit. Write for Blast Hole Data Sheet Form 117. Your answers to the questions on this data sheet will in no way obligate you, but will enable us to give you very complete data as to what a Cyclone Big Blast Hole Drill could do for you.

Cyclone Blast Hole Drills are guaranteed to drill more holes at less cost than any other big blast hole drills of equal capacity on the market. We will put this in your sales contract—or, we will place one of our outfits in your quarry against any or all other makes. If the Cyclone does not outdrill and outwear all other outfits we will remove it from the work without cost to you.

THE SANDERSON-CYCLONE DRILL CO.

ORRVILLE, OHIO.

Eastern and Export Office,
1778 Broadway, New York City



PAIGE

The Most Serviceable Truck in America

MOTOR TRUCKS

The superiority of Paige Motor Trucks from the standpoint of economical and dependable performance was not attained by imitation.

In building Paige Trucks we have always prided ourselves on being leaders, not followers. We have constantly looked forward rather than backward. We have thought less about the recorded accomplishments of the past than about the possible achievements of the future.

This conception of our duty as progressive truck builders finds definite expression in the originality of Paige truck design.

Throughout its construction, the Paige possesses in a marked degree the qualities of stamina, strength and mechanical excellence. Into it are built the essentials for rendering efficient haulage service under all of the widely varying conditions of modern truck usage.

As the product of an institution whose integrity and good standing have never been questioned, the Paige is a motor truck in which you can place unreserved confidence. Your faith in it will be more than justified by its continued honesty in delivering a full measure of service day after day, throughout its exceptionally long life.

PAIGE-DETROIT MOTOR CAR COMPANY, DETROIT, MICHIGAN

Manufacturers of Paige Motor Cars and Motor Trucks

Steep grades are easily mounted with a string of trailers back of this machine in snow, mud and sand. Seemingly impassable roads can be traveled with loads of from 20 to 50 tons.

The LOMBARD AUTO TRACTOR-TRUCK

The above illustration shows the machine with load on platform, but does not clearly illustrate that there is a string of heavily loaded trailers back of it, although it is negotiating this grade from down in the valley with a heavy load.

It is a regular performance for this machine equipped with our 140 H. P. motor to handle a load of 30 tons on trailers back of it at a road speed of 6 miles per hour. THIS MEANS BIG DAILY TONNAGE.

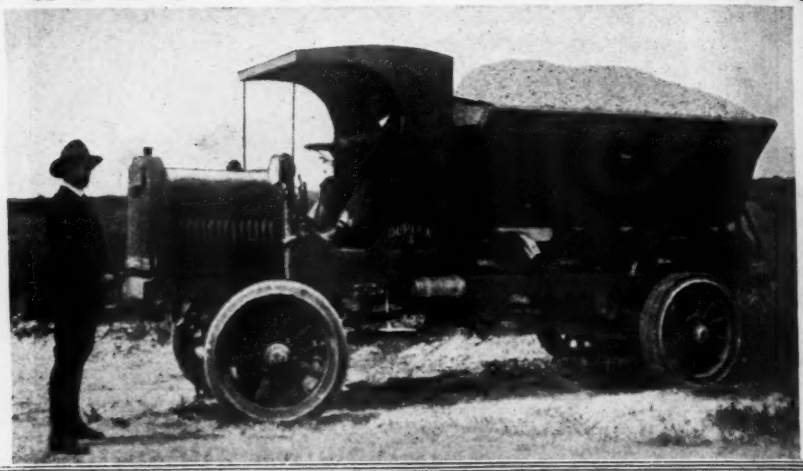
Send us complete details in regard to your work, such as length of haul, kinds of roads you haul over and your present cost per ton over any given length of haul and we will send you one of our estimate sheets showing what your work should cost under the conditions you describe.

Lombard Auto Tractor Truck Corp.

480 Lexington Ave. New York City, U. S. A.

DUPLEX TRUCKS

BUILT FOR BUSINESS



The Duplex Limited

High Speed—Pneumatic Tired—Medium Capacity—Full Electrical Equipment—Here is a Truck that Does its Work Economically.

One of the significant developments of these times in the truck industry is the increasing tendency for men to *buy* their trucks—and to let fewer and fewer to be sold to them.

Look at the success of the Duplex Limited. Already it is an established success—with a steadily growing demand coming from all sections and from men in all lines of business.

If you contemplate buying a truck of medium capacity, look over the Duplex Limited. Have your local Duplex dealer show you the Limited. Note its wonderful ruggedness and mechanical superiority.

It is a Duplex through and through—and as such a very safe investment for all general hauling.

Gentlemen:

We have used a Duplex Truck for two years and find it will do everything that the Company claims it will and a great deal more. We are hauling from five to seven tons every load, over heavy gumbo roads that are impassable for a two-wheel drive truck. When it is wet you cannot see the spokes in the wheels and teams can hardly get through, but we use the Duplex all the time.

In regard to comparing it with horses we could not do our work with horses for double what we can with the truck. We still keep horses, but never use them for hauling; they are too slow and too expensive. Our hauling is mostly sand and gravel and our town is rather hilly so one cannot pull a load with a team up our grades without four head, but our Duplex climbs all the hills with ease. We are going to order another Duplex just as soon as we start our spring work.

Our repairs have been small, not quite $20 for two years outside of springs. We have bought two new springs—one rear and one front, but we are overloading our truck about 100 per cent all the time. We make trips into the country now that we could not make with horses, and all our country trips are made in the evening, after a day's work in town.

Respectfully yours,
(Signed) D. L. MARSHALL & SONS.

THE facts in the foregoing letter are typical of Duplex users wherever heavy dead loads are hauled under adverse conditions. The more difficult the conditions, the better Duplex quality and ability shows to advantage.

It explains why the Duplex is known everywhere as one of the oldest and most successful trucks in America.

As long as any wheel of a Duplex finds traction it will haul. And where every wheel has contact it will haul more economically, because every wheel, both front and rear, pulls all the way, and exerts double the leverage.

Business men are standardizing on Duplex trucks because of their certainty of service and maintenance economics, and because of their dependability in transportnig all loads over good or bad roads.

The facts about Duplex hauling are interesting and profitable to every business man who considers motor trucks not merely from the viewpoint of expense, but also as a better investment.

DUPLEX For Business

Duplex Truck Company
Lansing · Michigan

One of the Oldest and Most Successful Truck Companies in America

How An FWD Saves $567 In One Month—And Then Some

"Our FWD, after several years of service, is still going strong. It is equipped with a 67 cubic foot body of the self-dumping type, and is hauling crushed stone an average distance of 1¾ miles, 4½ tons to the load, 20 trips every 10 hours. It costs for driver, $5; gasoline and oil, $4.

The truck was given credit during the month of July for hauling rock at just what it cost us to haul by team, and after charging all operating costs, it showed a credit of $567."—Hicks Engineering Company, Vulcan, Mich.

Short over-all length, easy steering, small turning radius, and 56-inch standard tread enable the FWD to get in and out of sand and gravel pits quickly and safely. Saves trip time—hauls more loads.

A complete line of special equipment adapts the FWD to any building or hauling task.

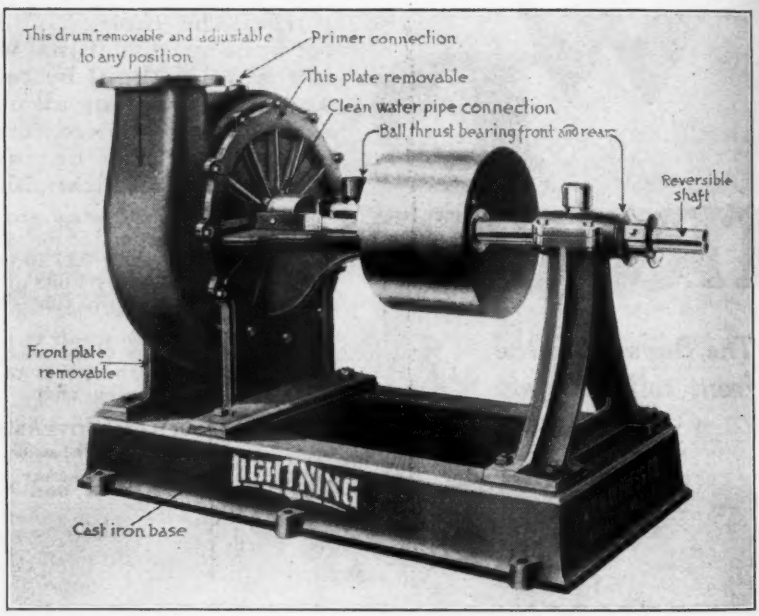
FWD TRUCKS

The Boys from the front will tell you

The Four Wheel Drive Auto Co.
Dept. 114 Clintonville, Wis.
Canadian Factory
Kitchener, Ont.

The Lightning Sand Pump

The ideal pump for sand companies and contractors—easy to operate, easy to adjust, easy to replace parts.



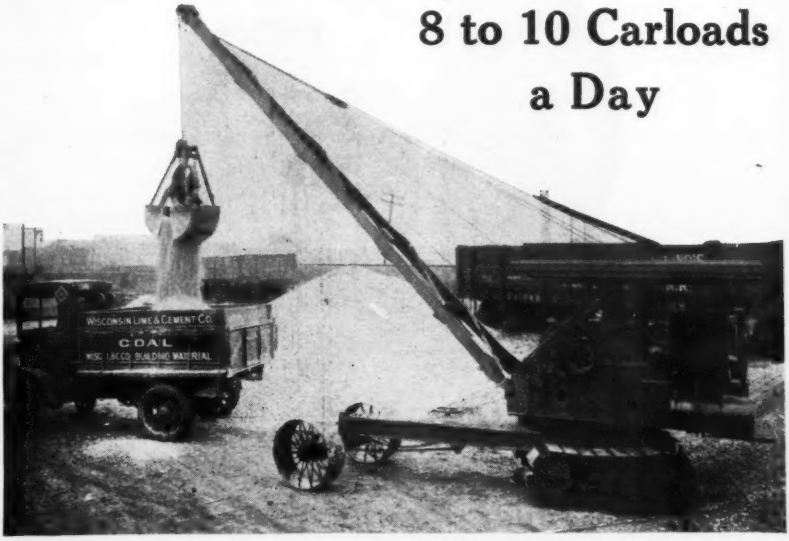
Write for prices and full information.

Address Pump Dept.

Kansas City Hay Press & Tractor Company

Kansas City **Missouri**

8 to 10 Carloads a Day



THAT is what one Chicago concern, the Wisconsin Lime & Cement Co., is doing with a P & H Excavator Crane—unloading 8 to 10 carloads a day, with a man in charge who is not a high-priced licensed engineer.

The P & H requires no propping or stabilizing, and can be shipped without dismantling.

And it will do many things beside unload sand, gravel, crushed rock, and other loose materials.

Get the whole story in our Bulletin 5X.

PAWLING & HARNISCHFEGER CO.

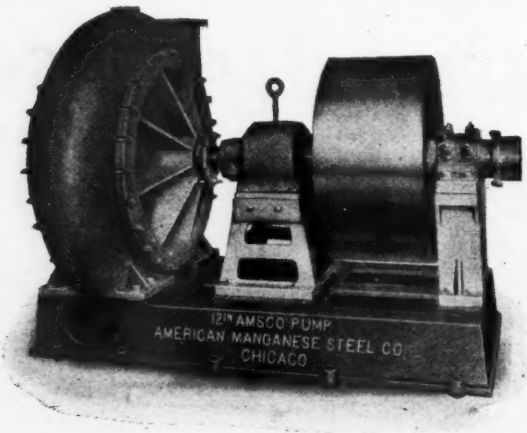
50 Church St., New York
704 Stephen Gerard Bldg., Philadelphia
926 Whitney Central Bldg., New Orleans, La.
47 Fidelity Bldg., Pittsburgh, Pa.

EST. 1884

MILWAUKEE, WIS.

1241 Monadnock Block, Chicago, Ill.
Pittock Block, Portland, Ore.
1125 Central Bldg., Los Angeles
821 Monadnock Bldg., San Fancisco.

P&H — excavators — back-fillers - tampers



AMSCO

Sand and Gravel Pumps Give Satisfaction

Of rugged construction, built for hard service. They stand up day in and day out, month after month. Their operating efficiency—percentage of days on active duty—is the reason they are bought in ever increasing numbers.

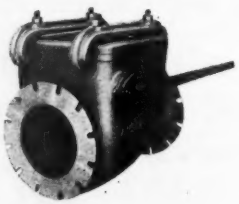
Manganese Steel for shells, runners, and side plates gives longest wear.

Slotted Flanges in side plates dispense with troublesome stud bolts. Solid ring gaskets are used.

Thrust Collar ball bearings reduce end thrust friction losses.

Balanced Runner and extra heavy shaft make the AMSCO Pump a smooth running machine.

AMSCO **Flap Valves**
Pipe
Elbows



Write for Pump Bulletin.

American Manganese Steel Co.

General Offices: 1875 McCormick Building, Chicago

Western Sales Office: Newhouse Bldg. Salt Lake City
Pacific Coast Office: Insurance Exchange Bldg. San Francisco, Calif.
Eastern Sales Office: Hudson Terminal Bldg. New York City

Foundries: Chicago Heights, Illinois—New Castle, Delaware—Oakland, California

Pit and Quarry

A Monthly Journal for Producers of Sand, Gravel, Stone, Cement, Gypsum and Lime
Member Audit Bureau of Circulations

VOL. 4 CHICAGO, ILL., MAY, 1920 NO. 8

Index to Advertisers

Advance Engineering Co. 112
Aero Pulverizer Co. 127
Aetna Explosives Co. 31
Allied Belting Co. 132
Allis-Chalmers Mfg. Co. 14
American Manganese Steel Co. 44
American Pulv. Co. 116
Arnold & Weigel 111
Atlas Engineering Co. 121
Atlas Powder Co. 27
Austin Co., Inc., F. C. 108
Austin Mfg. Co. 22
Automatic Dump Car Co. 126

Bacon, Earl C. 113
Ball Engine Co. 3
Barber-Greene Co. 34
Bates Valve Bag Co. 116
Bay City Dredge Works 10
Bell Locomotive Works 93
Bonsack Machinery Co. 106
Bradley Pulverizer Co. 117
Brown Portable Conveying Machy. Co. 121
Buchanan Co., Inc., C. G. 48
Buckeye Boiler Skimmer Co. 137
Butterworth & Lowe 112
Byers, J. F., Machine Co. 124

Caldwell & Son, H. W. 89
Chicago Elec. Const. Co. 101
Chicago Perforating Co. 110
Clark Dust Collecting Co. 138
Columbus McKinnon Chain Co. 118
Cooley Bros. 105
Corns Conveyor Belt Co. 109
Coyle & Roth 125
Crescent Belt Fastener Co. 33
Curtis Pneumatic Machy. Co. 134

Dake Engine Co. 137
Dick Co., Inc., R. & J. 132
Donahoo Co., J. F. 103
Duplex Truck Co. 40

E. I. Du Pont de Nemours & Co. 29
Eagle Pencil Co. 114
Easton Car & Const. Co. 35
Ensign Bickford Co. 115
Equipment Corp. of America 99
Erie Pump & Engine Works 134
Erie Steam Shovel Co. 3

Fate-Root Heath Co. 70, 71
Fire Gun Mfg. Co. 108
Four-Wheel-Drive Auto Co. 41

Gandy Belting Co. 114
Gifford Wood Co. 128
Grasselli Powder Co. 28
Good Roads Machy. Co. 23
Gregory Electric Co. 105
Grimshaw Co., Wm. B. 101
Grunder Pat. Crusher & Pulv. Co. 24

Halss Mfg. Co., Geo. 128
Hardsocg Wonder Drill Co. 4
Harrington & King Perforating Co. 125
Hell Co. 126
Hendrick Mfg. Co. 124
Hercules Powder Co. 30
Hockensmith Wheel & Mine Car Co. 108
Hoisting Machy. Co. 105
Howe Chain Co. 118
Hubbard-Floyd Co. 103
Hunt & Co., Robt. W. 111
Hyman-Michaels Co. 109
Ideal Engine Co. 110
Insley Mfg. Co. 122
International Clay Machy. Co. 111
Interstate Equipment Co. 109

Jeffrey Mfg. Co. 16

K-B Pulverizer Co. 18
Kansas City Hay Press & Tractor Co. 42
Kingsford Foundry & Mach. Works... 127
Klein & Co., Nathan 104
Kleinhans Co. 96
Koppel Industrial Car & Equip. Co. 123
Kritzer Co. 95

Leschen & Sons Rope Co., A. 12
Letson Co. 102
Lewiston Fdry. & Mach. Co. 26
Lidgerwood Mfg. Co. 136
Limo Locomotive Works 8
Link-Belt Co. 91
Locomotive Crane Co. of America 5
Lombard Auto Truck-Tractor Co. 39
Loomis Machine Co. 25

McAuliffe, P. J. 111
McCord Mfg. Co. 138
McFarlane-Eggers Machy. Co. 113
Machinery Sales Co. 98
"Manierre" 109
Mansfield Engr. Co. 115
Marion Steam Shovel Co. 36
Midwestern Co. 104
Morris Machine Works 46
Muncie Oil Engine Co. 130

Nye Steam Pump Co. 114

Ohio Tile Machinery Co. 13
Osgood Co. 123

Paige-Detroit Motor Car Co. 38
Pawling & Harnischfeger 43
Pittsburgh Iron & Steel Foundries 119
Portable Machinery Co. 120
Power Manufacturing Co. 136

Quaker City Rubber Co. 32

Railway Motor Co. of America 103
Raymond Bros. Impact Pulv. Co. 139
Reading Engr. Co. 97

Sanderson Cyclone Drill Co. 37
Sauerman Bros. ..... Front Cover
Schaeffer Engineering & Equip. Co. 15
Smith Co., L. F. 105
Smith Engineering Works 21
Stephens-Adamson Mfg. Co. 2
Sunbury Mfg. Co. 120

Taylor Chain Co., S. G. 119
Terry Mfg. Co., E. F. 112
Track Equipment Co. 122
Traylor Engineering & Mfg. Co. 19
Tyler Co., W. S. 6

U. S. Crane Co. 109
Union Chain & Mfg. Co. 112
Universal Road Machy. Co. 117
Used Equipment Bargains 96-107

Valve Bag Co. of America, The 11
Victor Bulata & Textile Belting Co. 95
Vulcan Iron Works 9

Wickes Machinery Co. 110
Williams Patent Crusher & Pulv. Co. 20
Wilson Machy. Co. 101
Wood Drill Works 113
Worthington Pump & Machinery Corp. 17
Whitcomb Co., Geo. D. 7
Watkins, F. A. 108
Watt Mining Car Wheel Co. ..... Back Cover
Western Metal Products Co. 110

PIT & QUARRY is published at 875 Rand-McNally Building, Chicago, Ill., by Complete Service Publishing Co.
Subscription price, $2.00 per year. Sample copies, 25c.
Contributors and advertisers should have copy in the office by the 15th of month preceding publication, as forms close at that time.

Established
1864

Morris Standard Sand Pump

For ordinary work where the head is low and material light our standard type of pump will give excellent results.

This style is built either directly connected to engine or motor, also belt drive.

Circular 15 tells all about sand pumps. Better send for your copy.

Morris Machine Works

Baldwinsville, New York, U. S. A.

Branches in Principal Cities.

Pit and Quarry

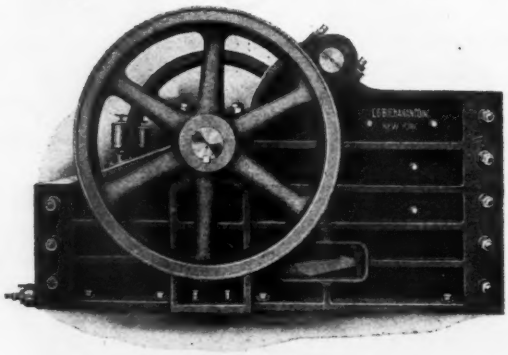
A Monthly Journal for Producers of Sand, Gravel, Stone, Cement, Gypsum and Lime
Member Audit Bureau of Circulations

VOL. 4 CHICAGO, ILL., MAY, 1920 NO. 8

CONTENTS OF THIS ISSUE

This Plant Makes Seven Sizes of Material.... 49
Easy Way to Convert Box Cars..... 53
Editorial 54
Equity in Freight Rates..... 55
Some Principles of Selecting Quarry Machinery 58
Lime Convention in June..... 60
Much Money for Paving in Frisco..... 61
Why the Fight Was Called Off..... 62
Calling Producers to Account..... 67
Lady Is Lime Manager..... 68
Trucks Do 95 Per Cent of Hauling..... 72
Relief from Traffic Handicap..... 73
Trucks Save the Day..... 74
Motor Truck Advantages..... 76
Depreciation of River Equipment..... 77
Associate Membership Created..... 78
Uniform Cost Sheet..... 78
Notes of Eastern Producers..... 80
Quarry Records 82
Looking for Candidates..... 83
Building Supply Industry in Canada..... 84
Developing Lime Plant in Oregon..... 87
New Issues of Stock by U. S. Gypsum..... 88
Rates on Crushed Stone..... 90
Recent Patents 94
Boiler and Furnace Testing.....131

Crushers of Unusual Strength



The first large BUCHANAN Jaw Crusher, a 48″ machine built over ten years ago, was the first large Jaw All Steel Crusher ever built.

This machine has given constant satisfactory service and is now still in daily operation. Since that time the Buchanan Crusher has always been the choice of conservative engineers and today there is not one of our large machines but has given entire satisfaction to its owners. The Buchanan is the Pioneer Large All Steel Jaw Crusher embracing every real improvement in Jaw Crusher design including several patented features.

BUCHANAN JAW CRUSHERS
ALL STEEL PATENTED

All BUCHANAN Crushers are furnished with our patent adjustable jaw stroke, water-jacketed, bearings, jaw plates, toggle bearings and cheek plates of Manganese Steel.

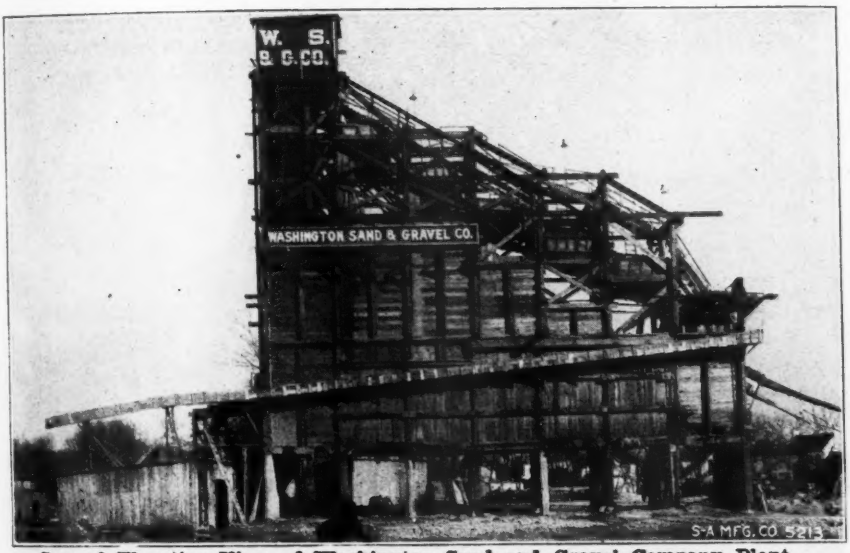
The most complete list of sizes from 5″x12″ to 66″x86″.

C. G. BUCHANAN COMPANY, INC.
91 West St., New York, U. S. A.
Southwestern Office:
Mills Building El Paso, Texas

CRUSHING PLANTS COMPLETE—MAGNETIC SEPARATORS

Pit and Quarry

Vol. 4 Chicago, Ill., May, 1920 No. 8



General Elevation View of Washington Sand and Gravel Company Plant

This Plant Makes Seven Sizes of Material

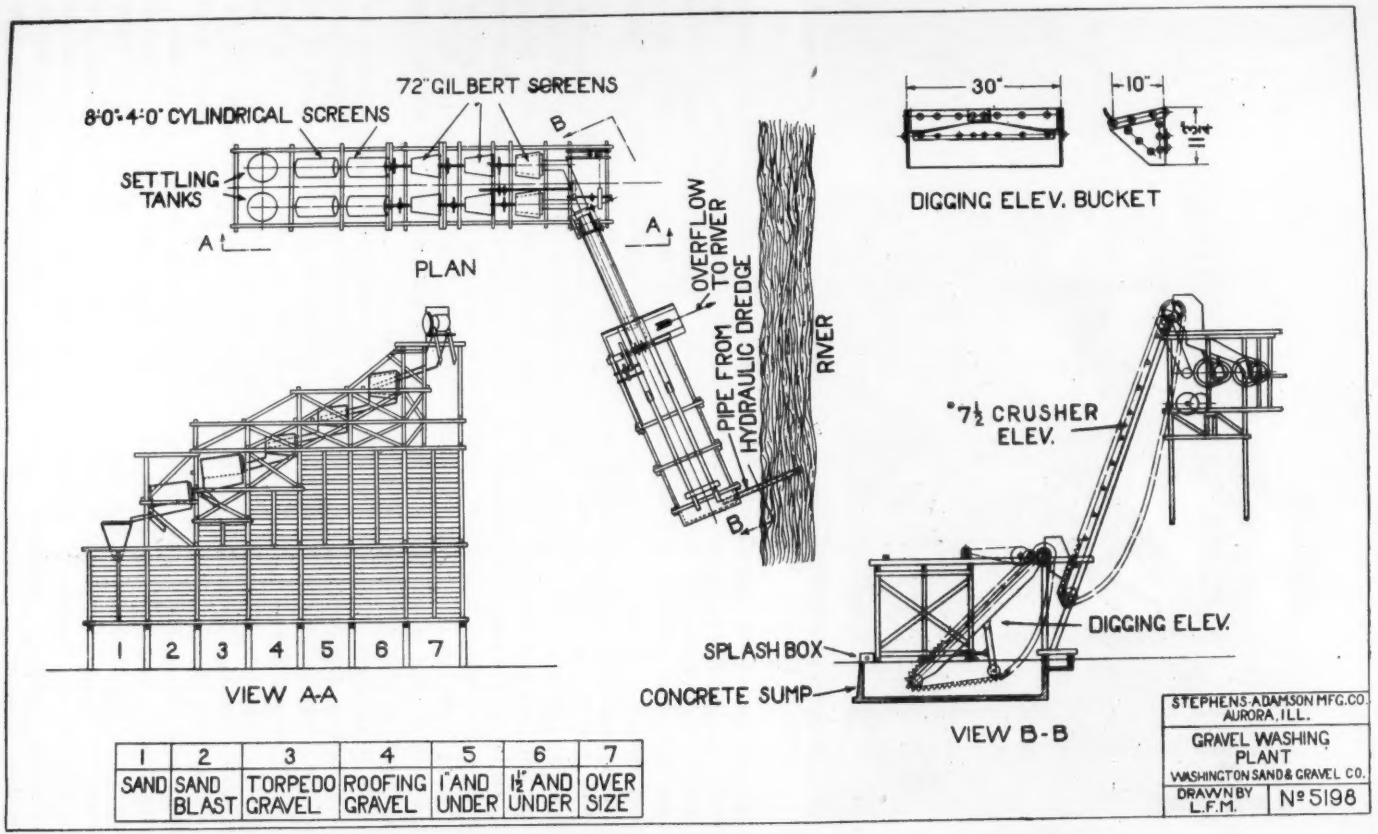
SEVEN sizes of material are separated at the plant of the Washington Sand and Gravel Company, Bladensburg, Md. The material is quite remarkable in its makeup; the texture is similar to granite and there is wide variation in the colors. Some of the stone is of deep, rich red, resembling certain grades of Tennessee marble; then again there is a pure white, pink, and a darker colored variety resembling the darker grades of marble. This material when crushed adapts itself to high-class stucco work and is also in great demand for ornamental floors where the stone is cast in the cement and later surfaced by machine.

The material that is over 1½ inches is separated out as oversize, the next size being 1½ inches and under. The third size is 1 inch and under and in sequence, roofing gravel, torpedo gravel, sand blast, and finally sand. With the exception of torpedo and sand blast, the material is used almost exclusively in all classes of reinforced concrete work. The gravel

Continuous Bucket Elevator Being Loaded by Digging Elevator; Screening Plant at Left

being about 80 or 90 per cent quartz, and consequently very hard, has about the same crushing resistance as a high-grade limestone. The gravel of the torpedo size is used for reinforced concrete construction where the slab or work is comparatively thin and where a small-size gravel is desired. It is also used extensively for a pebbledash finish or in stucco work for high-grade ornamental concrete construction. The sandblast material is so hard and sharp that it is used with great success for cleaning foundry castings and for cleaning building exteriors.

The Washington Sand and Gravel Company are so enthused about the class of material which they are producing that some time in the future they anticipate installing a picking conveyor where the larger stones of different color may be selected and separated. These stones will be



1	2	3	4	5	6	7
SAND	SAND BLAST	TORPEDO GRAVEL	ROOFING GRAVEL	1" AND UNDER	1½" AND UNDER	OVER SIZE

STEPHENS-ADAMSON MFG. CO.
AURORA, ILL.

GRAVEL WASHING PLANT
WASHINGTON SAND & GRAVEL CO.

DRAWN BY L.F.M. | Nº 5198

Digging Elevator that Reclaims Aggregate from Concrete Sump Tank

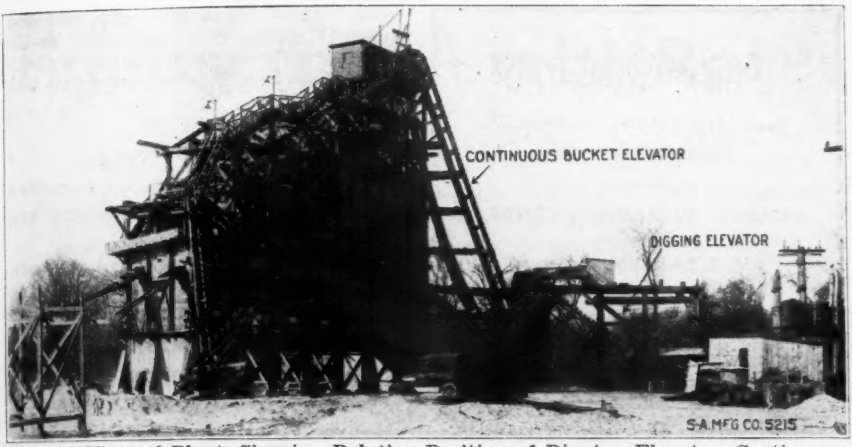
crushed and sized and should command a high price for special ornamental work where the excellent texture and color qualities will be most desirable.

The aggregate is drawn from the river bottom by large motor-driven dredging pumps. The material discharged from the pipe line is dumped into a large concrete sump tank, which is provided with an overflow spout running back into the river. Operating in this tank is a large Stephens-Adamson digging elevator. This elevator is equipped with 30x10½x11¾-inch buckets mounted on two strands of No. 844 manganese steel chain. The steel buckets are heavily reinforced and are furnished with a pointed digging lip securely riveted to the front of the bucket. Dipping down into the concrete tank, the digging buckets take their load and discharge at the head end of the spout. From the spout the material is loaded directly into the buckets of Stephens-Adamson crusher elevator. The crusher elevator is mounted on a standard timber frame and is fitted with 24x10x13½-inch buckets mounted on extra heavy rubber belt 2 [illegible] hes wide. The elevator discha[illegible] the material at the top of the plant, directing the aggregate into the spouts which run to the screen.

The screening plant is composed of two batteries of screens with a settling tank at the foot of each battery for the separation of sand. There are five sets of screens, one pair of jacketed Gilbert screens, two sets of Gilbert screens and two sets of cylindrical screens.

The continuous bucket elevator discharges the gravel into a large chute, which divides and sends half of the material to one line of screens and half to the other side. Serving the screens with a continuous bucket elevator operating at a steady speed gives uniform capacity at all times.

The first pair of Gilbert screens is fitted with screening jackets, which reject the oversize material and pass everything of 1½ inches diameter and under. The second pair of Gilbert screens reject 1 to 1½-inch; the third set ⅝ to 1 inch, and so on in sequence,



General View of Plant, Showing Relative Position of Digging Elevator, Continuous Bucket Elevator and Screening Plant

the roofing, torpedo, sand blast and sand products are secured.

The entire installation for the Washington Sand and Gravel Company was designed and manufactured by the Stephens-Adamson Manufacturing Company, Aurora, Ill. The detail drawings for the timber storage bins were prepared by this company.

This plant is an example of a washing and screening outfit for producing seven sizes of material. While it is more generally required to separate out only about three or four sizes of material, it is easily possible with the correct equipment to make many more separations for certain sizes of product.

The Glaira Sand & Gravel Company, Zanesville, Ohio, has increased its capital stock from $10,000 to $25,000.

The Kosmos Portland Cement Company, Louisville, Ky., whose plant is located at Kosmosdale, near Louisville, owing to the large increase in their business has found it necessary to increase their capitalization from $1,000,000 to $1,500,000, amended articles of incorporation to that effect having been filed. Their stock issue will consist of 15,000 shares, whose par value will be $100. Samuel Horner, Jr., and Charles Horner signed the amendment.

Easy Way to Convert Box Cars

Chicago Stone Producer Suggests Method for Putting Them Into Service

MR. J. J. Sloan, Wisconsin Granite Company, Chicago, has made the following suggestion to relieve car shortage and enable box cars to be used for open top purposes without unnecessary labor or expense.

"Cut an 18-inch opening through the roof at a point about 10 feet from each end of the car, and similar openings through the floor—both openings could be protected with lock and cover. The bottom openings would enable the cars to be used for all classes of coal, coke, stone, sand, gravel and other commodities usually shipped in hopper or bottom dumps, the greater part of the load over the trucks. For grain and similar purposes they can be much more easily loaded without having to shovel material in both ends of car and would make for heavier loading. It will probably not require over $50 expense to change box cars to meet the above conditions."

Pit and Quarry

Rand-McNally Bldg., Chicago, Ill.

Published Monthly

HARRY W. BAUMGARTNER
Publisher

V. E. LARSEN, Manager

E. S. HANSON, Editor
D. J. HAUER, Associate Editor

Pertinent Traffic Suggestions

SOME really constructive work to relieve freight congestion is being done by the Material Handling Machinery Manufacturers Association. In a recent bulletin sent out from the office in New York, the following pertinent suggestions are made:

In the United States there are about 2,452,000 freight cars now in use. One hour saved each day for each car would equal 2,452,000 car-hours per day. Dividing this figure by 24 (hours per day), it is self-evident that the public would have over 102,000 additional cars to use through this simple saving of one hour per car per day.

This would relieve business of a large proportion of present car shortage, and directly speed up production for the entire country in a very effective way.

This Association realizes the present car shortage may be helped materially if attention of everybody is directed to the possibility of keeping more cars in motion on the railroads.

This may be accomplished if every person or company loading or unloading cars will explain to the crews doing the work that every car released quickly, helps each maker or manufacturer to increase his ability to get his goods quicker and at less expense. This ultimately reduces living costs for the crews and all.

The installation of handling machinery for speeding up and relieving the hard manual tasks will help, but the essential thing is a realization on the part of all concerned that every car-hour saved benefits the public just that much.

Truck Drivers

IN SOME correspondence regarding motor trucks a Massachusetts producer writes:

"When you touch the truck question it might be well to give consideration to the quality of labor necessary in operation, as many of my acquaintances have had unpleasant experiences on what looked like simple trucking problems on account of the poor quality of labor which it was necessary to employ. It might be well to advocate the training, to a greater extent than is now done, of truck operators by the various manufacturers of motor vehicles."

This is a good point, to be sure, and worth taking into special account in these times when expert help is difficult to get; but the general opinion of employers seems to be that one reasonably good truck driver is easier to get—and far easier to control after he is secured—than the four or five team drivers whom he displaces.

So let us get the best possible truck drivers, and take steps for training up still better ones; but let us not forget the ills from which even the under-trained truck driver has relieved us.

THERE is little opportunity for an exact division of labor around a pit or quarry. Every man should be familiar with every job. For this purpose many employers have a certain round of duties through which they carry a new man until he knows the whole plant. It's a good idea.

Amended articles of incorporation have been filed by the Mississippi Sand & Gravel Company, of Burlington, Iowa, to authorize the increase of their capitalization from $50,000 to $150,000.

Equity in Freight Rates

Mr. John Rice, President National Crushed Stone Association, has written this letter to the Interstate Commerce Commission with reference to equity in freight rates on mineral aggregates compared with freight rates on other commodities. Mr. Rice's letter has made an impression on those who have rate making duties.

Interstate Commerce Commission,
Washington, D. C.

Gentlemen:

At the annual meeting of the National Crushed Stone Association held in Louisville, Kentucky, during the week beginning February 9th, there was earnest consideration given to the question of the railroad freight rates as affecting the crushed stone industry directly, and, indirectly, the interests of the nation at large. As the result of this meeting this statement has been prepared to acquaint you with facts which may have escaped your attention, to arouse your interest and perhaps it is not too much to hope for, to enlist your sympathetic investigation.

The stone industry is as old as industry itself but the crushed stone industry, in the modern sense, is in comparative infancy and its tremendous importance is little appreciated. The air we breathe, the water we drink, and the soil that makes agriculture possible, the earth that is used in a railroad embankment are taken into little account in the general economy of life, not because of a lack of knowledge of their usefulness but by their very overshadowing importance they are treated as matters of course. So it is with crushed stone.

The pertinency of the foregoing becomes evident when any list of basic industries is mentioned, such as coal, iron, steel, cement, lumber, glass, sand, and gravel. Crushed stone is almost never included.

Crushed stone enters into almost every conceivable kind of construction which enlists the activities of mankind. The mere statement of the fact presents a vista of the ramifications of this industry that renders argument entirely superfluous. However, a few facts may emphasize the situation.

The most important financial and economic problem facing the nation today is the construction of highways. The work as yet has scarcely begun and still in the last ten or fifteen years more thought and effort have been expended upon this question than during the entire previous life of the nation.

There are some two million miles of highways in the United States outside of the cities. In the next thirty years they should, and in large part they probably will, be improved in some form or other, but by whatever method stone or gravel will be the principal factors. Such construction will require some six billion tons of stone; the railroads will require another billion tons; general construction of other kinds will require another billion; the renewals and repairs will require approximately as much more, resulting in a total demand of probably fifteen or sixteen billion tons during the next thirty years. This means a demand of some five hundred million tons annually or the work

cannot be performed. This will entail a capital expenditure of Five Hundred Million Dollars and will employ one million men. These figures appear startling and a figment of the imagination plucked from the realms of fancy for the sake of creating an impression, but the statements made represent only some five or six times the present magnitude of the industry.

Less than a generation ago there were few investments in this industry amounting to more than $25,000 to $50,000. In the past dozen years there have been hundreds of plants erected, at a cost of from $100,000 to $500,000, and in the past five years some have involved an expenditure as high as $2,000,000 in one plant. Such plants reduce cost, relieve the weary drudgery of the laboring man, and release them to activities more congenial and less burdensome, but to justify such installations means a concentration of tonnage which must be transported to a wider market than in the past. The product must be largely transported by rail and since the value of any commodity is its value at the point of use, and not at the point of origin, the tremendous influence of transportation charges becomes most apparent. In the case of crushed stone one-half of such value is freight.

There is a phrase in freight parlance which has become almost a maxim—"What the traffic can bear"—and it has been unquestionably the basis of the present freight structure of the country. In a large way, it always will be because it is founded on logical economic principles.

However, it seems evident that in the future the Government is going to underwrite the securities of the railroads in some way and as the result it may and must give consideration not merely to the financial and economic conditions as affecting the railroads, but also to the wise and equitable apportioning of the necessary revenues upon the product of the various industries affected, always mindful of stimulation, not discouragement.

It is the earnest belief of this association that the present revenue derived from crushed stone is proportionately greater than from many other commodities, aside entirely from the fact of their greater ability to stand the heavier burden. Whether this belief is true, the fact is unquestionably susceptible of proof. It is not difficult for the shippers in the industry to establish the revenue earned on crushed stone but it is a monumental task to make the comparison with other commodities. Such an investigation seems a function and an obligation of your honorable body in the interest of justice to all shippers. In addition to the discriminatory condition believed to be true as aforestated, your attention is respectfully directed to the following proposition.

The cost of transportation is made up of two broad elements, one which may be called the "assignable" expense, which is that character of expense which can be reasonably and with some definiteness assigned to the cost of handling freight of various classifications with due regard to its peculiarities; the other which may be designated the "overhead," consisting of all other charges than aforesaid, covering interest on bonds, taxes, insurance, general administration expenses, and that proportion of actual operating expenses which are of a general nature.

All traffic should bear, first, its "assignable" expense, and the "overhead" should be apportioned to various commodities in accordance with their ability to bear it. Such a theory is based upon the principle that the value of an article is at destination, and not at point of origin, and therefore the more costly commodity can with reasonable expectation bear the larger proportion

of this overhead. This is merely applying to transportation the principle applicable to a by-product in any industry. When a by-product is first discovered or developed its cost is usually not loaded with its proportional share of the overhead of the related industry. Generally speaking, if it were, the price at which it would have to be sold would be prohibitive. But when it has risen from this incidental to the essential relationship to its industry it carries with it its full proportionate share of overhead based on its value.

The principle involved may also be illustrated in the experience of the return haul of empty cars. Let us, for the purpose of illustration, assume a movement of cars East from an old established coal mining center, with a Western return of cars empty. The coal tonnage must bear the expense of this double-way movement. However, it occurs that in the course of time a new commodity springs up requiring a Western movement. In order to encourage the movement of this commodity the railroads have in the past very naturally and logically, made a rate to encourage this growth. It is a rate frequently only a trifle more than the "out-of-pocket" expense, because whatever it is, it produces some return in excess of outlay and is that much better than nothing. In time the new commodity gains strength and the burden of the overhead is gradually loaded upon it to the extent that it can bear without strangulation and therefore the two commodities do or should carry a rate proportioned to their ability to bear it, and to ultimate advantage to the railroad, and the shippers of the respective commodities, when proportioned with judgment.

In the evolution of this principle, gross, though possibly unwitting, discriminations have occurred.

It is believed that crushed stone is such a commodity as has been gradually loaded from a point of original encouragement to a point beyond its fair share. The decision of your Commission in the case of the Birdsboro Stone Co. vs. the Pennsylvania Railroad, as well as a number of other decisions, evidence the fact that in the judgment of your Commission rates on crushed stone were relatively too high.

In view of these decisions it is hoped that sympathetic consideration of the problem may be given by your Commission and should simply a modification of rates be contemplated it will give more general satisfaction to this industry if the differentials between competitors be preserved as far as possible and the rates on crushed stone in force prior to the war as compared to those of other commodities are deemed to be more equitable than the existing rates and changes made now should preferably be based upon pre-war relationship.

However, and in conclusion, this Association seeks no selfish nor discriminatory advantage but urges a scientific reconstruction of rates as contrasted to modification and an equitable apportionment to all commodities of the revenue deemed necessary for the successful operation of the railroads. The Association stands ready to assist in the furnishing of any data pertaining to its industry as the Commission may request.

Respectfully submitted,

JOHN RICE.

Some Principles of Selecting Quarry Machinery

By Daniel J. Hauer

IN discussing the subject of choosing a quarry and mill plant, and the layout and design of plants and their various units, it is hardly possible in either a series of articles or even in a book to go into many details of all kinds of quarry machinery and the many kinds of quarries operated. For instance, a quarry and mill to produce marble slabs for plumbers and other interior finish, will need many kinds of machines that would be different from those used in a granite quarry producing monumental stone, or in a crushed stone quarry, or one producing lime; yet, there are some underlying principles that with little variation are applicable to all kinds of quarries. It is these principles and fundamentals that are to be discussed here.

The selection does not necessarily commence with plant to be used in developing and working the ledge, for the mill may be built first; but for the purpose of discussion it is logical to start with the ledge.

If the plant for stripping and developing the ledge can also be used in working out the rock, this should be done, as for instance, in a crushed stone quarry, if the stripping is heavy it would be possible to use a steam shovel for that work, and also for loading cars after the ledge rock has been blasted and broken up. If, though, a different type of machine must be used, then in selecting plant for stripping, the value of the plant, as compared to the probable time during the year it will be used, and the cost of operating, must be considered. It is evident that if the cost of operation of one machine over another is only a hundred dollars a year, while its cost would be some thousands more, the interest alone on the investment would exceed the annual saving in operation.

Everything being equal, a machine that both excavates and transports the waste should be used. This is the case with hydraulic machinery for stripping, cableways, and other types of plant.

. As it is with stripping, to some extent it is the same with machinery for working the ledge, except this machinery is likely to be used the greater part of the year, and much of it every day.

One class of machinery in which many quarrymen make mistakes in selection is that of pumps. It is not every quarry that must be drained or unwatered by pumps. In many cases if water is found in the ledge, ditches and pipes can be used to dispose of it; but in some few side hills and many pit quarries, pumps must be used to keep the quarry dry. At first the amount of water appears to be insignificant, so that a small pump is installed and with pipes of small diameter. The deeper the quarry is driven, or the wider area over which development is done, the greater becomes the volume of water that must be pumped. Thus it is quite common to see two, three or more pumps of small capacity installed, with a duplication of pipes, when one fair sized pump with a single pipe line should be used. This would mean less capital invested in pumps and their appurtenances, and the operating cost kept to the minimum. There is nothing about the ledge regarding which expert knowledge is necessary as much as pumping. It is needed in order to estimate the quantity of water that

may accumulate within twenty-four hours for the location of the pump, the size, the lift, and in fact almost every detail.

Next to pumping, and in fact in most quarries the operation on the ledge that takes first place, is that of loosening the rock from the ledge. Only a few decades ago, this was done mostly by hand methods, but today competition compels the use of machinery. For some quarries drills only are employed, but for others drills, gadders, channeling machinery, etc., should be used. The selection should be based upon local conditions and economic operation, rather than allowing good salesmen to dictate the apparatus to be used, as has been done in scores of cases during the past ten years. In other words, quarry owners using some type of machinery have substituted other types, simply because of arguments made by shrewd and experienced salesmen, arguments that were framed to sell machines, rather than to select those types that would mean economic operation of loosening rock from the ledge. One type of machine is seldom enough in a quarry; it is generally economical to have several kinds of machines, as conditions are bound to arise that call for other than the ordinary methods.

It is quite surprising how many quarries use hand methods for loading the raw product at the ledge to be transported to the mill. Besides old types of machines there are new ones on the market, and much money can be saved, not only in loading, but also in transporting the product; for it is evident that time saved in loading means quicker and more trips for the equipment used in the transportation, thus not only reducing the actual operating costs of loading and transporting, but also reducing the capital expenditure.

The largest labor cost around a quarry is generally that of loading and transporting the raw product from the ledge to the mill. It can be reduced considerably in amount by the use of modern machinery and equipment and up-to-date methods. Here is one place where time and motion studies count for much in deciding upon methods; and expert knowledge is of wonderful value. In one case within the writer's knowledge, $10,000 was saved in a year in a quarry by an expert studying the operation and effecting some economic changes. This meant a saving of about thirty dollars daily. The waste in many quarries in this part of the operation is quite surprising.

One economic fallacy in selecting equipment for transporting is to have the capacity too large. The reasoning is that, when a car is being used to serve a crusher, that if its capacity is 2 tons, a 4-ton car will mean cheaper operation. The same idea sometimes prevails as to carrying slabs or blocks into a mill. In some cases this reasoning is logical and sound; but if it means that there must be extra storage capacity, and the raw products must be handled once or twice extra, then the cost is enough to offset the possible saving that may be made in transporting. As a rule a mill should be fed with the raw product in just such quantities as to use it up by direct handling as it comes to the mill. This means continual trips in reasonable quantities, rather than fewer trips with larger loads.

For the mill, there are certain principles that are applicable to almost any type. The storage of material should be of the finished product rather than of the raw product. Above all machinery there should be ample head room to take out shafts, pulleys and other parts without cutting timbers and then making repairs. On the other hand, where elevation of floors can be reduced it shoud be done, for it means not only extra capi-

tal expenditure for this additional head room in putting up the structure, but there is also the additional cost of the installation of longer belts, higher elevators and other transmission machinery, besides the added cost for power in operation and that of maintenance. These things may seem small, but taken together it may represent not only a considerable investment but a large operating cost.

It is these details coupled with those of placing machinery, that is, the location of one machine to another, that makes an economical layout for operation. If machines are too far apart the handling of the materials is bound to cost more than when the various machines are so located that the products go direct from one to the other with the minimum amount of handling.

Unless each kind of mill is considered, it is not possible to go into details as to what kind of a crusher to install or the kind of a polishing bed in a marble mill. These details must be handled by those building or operating the mill. Expert advice in every case can be engaged, and even then men will differ as to the make and type of machines. It is only practicable to say that selection of machines should be based upon intimate knowledge of all types of machines on the market, remembering that machinery is not sold by the pound, but to perform certain work and give service. The low priced machine may be the most expensive in the end. The manufacturer's reputation may count for more than his price. Machines, to give service, especially those working on a material as hard as rock, must be well designed and built from those materials that have been tried out by the manufacturers. These considerations, together with the cost of power for operating, should be the governing factors in selecting and purchasing machines for the mill.

The same principles are applicable to that needed for handling and storing the products after they have passed through the mill. Storage bins, yards or sheds should be provided for the keeping of a stock on hand, or during the busy season, to handle the products for shipment. Handling by hand methods should be eliminated. As much as possible gravity should be used for moving the materials, but if this is not possible, then transmission machinery of some kind should be installed.

To accomplish the results indicated it is necessary to make plans and draw up specifications just as an engineer or architect would do for any structure.

Lime Convention in June

National Association Will Meet in New York For Two Day Session

THE annual convention of the National Lime Association will be held in New York, June 17 and 18.

This much was determined upon at the April meeting of the Board of Directors. No details have been worked out as yet, except that the meetings will be held at the Hotel Astor.

Work is going forward on the program, however, and it is expected that two days of good work will be put in for the development of the lime industry.

The work of the various branches of the organization will be reviewed, and plans made for their further activities.

The Haselton Stone Company, Youngstown, Ohio, has increased its capital stock from $50,000 to $70,000.

Much Money for Paving in Frisco

Other Indications of Good Business for Pit and Quarry Operators

PRESIDENT Timothy Reardon of the San Francisco Board of Public Works has announced that the budget of the board for the coming fiscal year totals something over $4,000,000. It is based on paying ordinary laborers $6 per day and every labor union raise in scale is included in the schedule. Among other matters the budget recommends the repaving of 200 blocks of asphalt, and also that many of these blocks be graded and reconstructed. The total salaries, maintenance and operation expenses are figured at $2,090,253. For special projects, such as the Esplanade, Reardon asks for $505,715. For new street work the request is for $1,500,000.

In addition to this street work which is to be done by the city a large amount of street work including paving has been agreed upon and will be assessed against property owners. All of which predicates a lively business for the rock quarries and sand and gravel pits during the coming fiscal year in this city.

While building operations have not as yet begun to be lively, a large number of concrete structures are planned and there is no doubt that many of them will be carried through during the year, to the benefit of such pit and quarry products that go into such buildings.

In road building, five northern counties, Siskiyou, Trinity, Shasta, Modoc and Lassen, are asking that the State highway commission assign enough money to them to build 165 miles of highway.

Santa Cruz county south of San Francisco, has recently let the last lap of county highway construction work, between Santa Cruz and Chittendens, a distance of nearly thirty miles. It is to be a concrete road and is the last part of the $945,000 road work voted last year by the county.

Other counties are letting or making arrangements to let contracts for the road building authorized at last year's elections.

The Santa Cruz Portland Cement Co., at its annual meeting increased its dividend rate from 5 to 6 per cent. W. W. Crosker was chosen director vice W. R. Berry, but otherwise there was no change in the directors.

The Oakland Building Material Co. has obtained permission from the California Commissioner of Corporations to sell 1,000 shares of its capital stock to the Oakland Paving Co., in exchange for certain real property situated in Alameda county.

The firm of Green & Williams, who now own the Stony Creek Gravel company's holdings, formerly owned by Dearborne Bros., expect to have a new rock crushing machine on the ground, and will turn out five carloads a shift with the machine.

The Ariss-Knapp Co., capitalized at $100,000, has been incorporated in Emeryville by B. W. Ariss, W. T. Knapp, E. Field, A. K. Ariss and F. A. Garcia for the purpose of manufacturing,. distribution and construction of bituminous rock products.

City Attorney Chas. S. Burnell of Los Angeles has given a written opinion to the Public Service Commission to the effect that under the city charter the Commission may lease the Monolith cement plant but that it cannot sell it. A Portland syndicate headed by Fred A. Ballin stands ready to lease the plant for a period of five years at yearly rental of $22,500.

WHY THE FIGHT WAS CALLED OFF

by Frank A. Halverson

Up where the rock boulders of Panther Mountain humped its huge bare shoulder high against the clouds was where Pard and I lived like princes in our shack, with me doin' the cookin' and housekeepin', until his sweetheart, Miss Margaret Fleming, horned herself into a runaway trip of mining cars, and Pard, like the rip-snortin' hero of a book, saved her, with me a-helpin', and the result was that Pard was goin' to leave me disconsolate in the batchin' shanty that with his presence I had called home. Somehow, Pard's goin' into matrimony put me into the mood of clutchin' onto life mighty careless. What was the use, anyhow! I never did get a pard but what he was a sure mark for the little love-chap with his arrow. The bunch had all gone that way—Jim, Bill, Walt and a host of others, when I done my best to keep them like myself, single. With Pard leapin' out of the trail of single harness into double, I felt I'd never forgive him. My bowl of friendship was full of lemon juice. He had thrown me down good house cleanin' days, what should I hear but an automobile snortin' its and plenty.

Reasoning that way on one of my protest at the steepness of the road that wound like a yellow ribbon up ol' Panther's rocky side. I listened 'cause a machine was about as scarce as single women up here in the Panther Mountain Coal Camp an', of course, their comin' was sure to be noticed. Still, the automobile sort o' quit its chuggin' as it looped the curve by the coal mine. Forgettin' the cho-cho machine for a second in the ardor of my cleanin', what did I do but find one of Pard's ol' shoes an' that started me on the mad trail again. My thoughts were hot an' yet I felt deep in my soul that I loved my ol' Pard. Hadn't I nursed that big boob when he was sick and cared for him like a doting mother, only to have him show his gratitude by leavin' me alone, all because I got a nasty bump on the head when the runaway car stopped at the bottom of the mine headin' and Pard did the rescuin' act of the girl when I was knocked out an' couldn't have a hand in it myself? 'Course he did, the galoot, an' I wasn't even a rival after that, an' now he was to be married some day next week. I didn't care. I wasn't to be present anyhow.

Turnin' with the ol' shoe in my hand ready to throw it through the open window, I drew back; but I didn't throw it. Far be it from me to desist in any undertakin', but I just dropped that ol' shoe as if I was goin' to deck it with flowers, 'cause standing' in my gate was Pard's girl wife-to-be, Miss Margaret Fleming. Didn't my eyes blink when I seen her! Her smile was of the fetchin' kind, as she stood lookin' at me holdin' that ol' shoe. And really, I just got jumpety all of a

sudden for I ain't hob-nobbed much in woman society an' I stick to my own element like a fish to water, for safety, of course.

"Hello, Pal Hawkins!"

It wasn't so much the friendly greetin', but the way she put the real honest-to-goodness feelin' into it which caused me to splash around in my thinker afore I could say, "Howdy," like a big man ought to do even if he is real good an' sore at the husband-to-be. But, shucks! I wasn't down any on that gal 'cause she was marryin' my Pard. Only she didn't need to seem so all-fired happy about it in my presence. Still I certainly put on the elegance an' showed her by my politeness that I wasn't of the uncouth type by a jugful. I 'pologized 'bout my flannel shirt an' jumpers not bein' the proper habiliment for a man to have on when so much downright pleasure was comin' to grace my home with her presence. Which, considerin' who it came from, was some nifty welcome on such short notice.

'Course, even if a man is huffy at a woman's husband he can't be enough of a galoot to not ask about said man without showin' a marked degree of ignorance an' so I asked about Pard.

"He stopped to inspect the new mine boilers," said she, comin' up close to me.

"What's mine boilers to Pard now?" I muttered sort of unthinkingly, but the gal heard me an' answered:

"Why, 'Pard' Wilson is to be the general superintendent of all the Fleming collieries, after we're married."

Fish-hooks! That's where his education had landed him! I never did understand why he had hung 'round the mines 'til now. General Superintendent! Why, then he was to be my boss! He could discharge me, too! The unmitigated son of good luck! Gittin' a gal like the one that stood in front of me an' a general superintendency thrown in was too much for my slow actin' brain to assimilate on the spur of the unexpected. Ain't it strange how some men fall right into the lap of good fortune, though, while others ride along on the humpety edge? But a man like my Pard ain't got no mortal right to expect Paradise after he's carried out, toes first—he gets his heaven on earth in continuous chunks.

"Pard's comin' up for dinner," she continued sweetly, "and I'm going to help you cook it."

Two "No-Ma'ams" was what I was goin' to answer right quick. But, hang it! Show me the man who can be so impolite to a woman! I'd kick him into the middle of a month of Sundays. But as for Pard callin' when the gal had already arrived into my domicile — well — that was strategy on his part, an' I wasn't long in recognizin' the subtle truth that he feared me 'cause he knew all right that I was sore at his goin' to get married an' that I wasn't coming to the weddin' an this was the foxy way he was takin' to square up with me. He had figured that if his gal came an' visited it would be all right for him to come, too, for I couldn't pitch into him with her lookin' on, could I?

"I'm goin' to help you get dinner, Pal Hawkins," said she, shovin' her head up to my shoulder an' lookin' me square in the eye. Gosh dang it! Ain't women got the greatest way in insistin' on get-

tin' what they want? Her chin was level, sort of stickin' out, an' by hunky! she was tip-toin' close with the blue speck of mischief in her eye playin' hobs with my disturbed self control. Somethin' kept whisperin', "look out, Pal! You goin' t' get somethin' real soon." 'Twas my guardian angel, sure.

"Why—Why," I stammered, but that's as far as I got 'cause I remembered that my stock of victuals was about all in. I was not prepared for company, not woman company, anyhow. An' again, there was another reason—I didn't have my supplies an' cookin' utensils in order for a woman to see my mode of housekeepin'. I let the fallin' water of Panther Creek wash my dishes by puttin' them under the splash, an' my cups an' saucers were in the wash just then. Furthermore, I had odd places for keepin' things I prepared an' I didn't want her to see them. She might be tempted to laugh. Women are awful finicky about the way a man keeps house, anyhow.

What could I do? There she stood lookin' at me, expectin' my answer, an' in the end we compromised. I promised myself that there were some angles to my culinary art that she wouldn't see. I immediately voted ham and eggs 'cause that's all I stood any earthy chance of gettin' ready out of my slim larder.

Jinks, but she was a dandy woman to get along with! Honest, if she hadn't been Pard's — but, shucks! Those are seditious thoughts for a bachelor. But I remember the night Pard and me rescued her out of the mine, she didn't even look at me a-tall. All I got was a bump on the head, while Pard—look what he was gettin'!

Suddenly she stopped fussin' 'round the stove an' said, "Pal Hawkins, Pard wants you to be his best man at our weddin'. You're his friend, you know."

Was I? Not much! She was tryin' to tease me to go to the weddin', eh? My mind's a Gibraltar in determination an' I quickly saw the scheme. My stern an' unrelentin' countenance should have been a-plenty but instead of givin' up she exclaimed, "Oh, Pal Hawkins, you're a big, big boy! Don't you understand that the bridegroom's best friend is an honorary privilege given only to the closest friend—and that's you!"

Cripes—no, I didn't! The rules must have changed since I read the etiquette book, or I'd slipped up a notch.

"And," she continued, "the bride has her bridesmaids, too."

"The dickens! What's bridesmaids, anyhow? Girls?"

"Why, yes," she replied. "In this case it's Hazel, and she's a dear girl and you'll like her, Pal."

She went on real chummy-like, sidlin' close up to me as I gave the fryin' ham the overhand flip real nifty.

Jingoes! This was suspicious business with girls in it. I knew my former Pard all right an' it would be just like him to sic a nice girl onto me if I got mixed up in that weddin' where I couldn't defend myself 'cause he had done stunts like that before an' had bushels of fun at my misery. He could do those things so nice and easy with his education an' slick ways while I floundered helplessly.

"Pal Hawkins, you must wear a dress suit," she further informed, lookin' quickly toward the window an' switchin' her laughin' eyes back to me again.

If there was anything more to that best man's outfit I didn't get it 'cause too much is too much. A miner like me ought to learn what's comin' by degrees and not get it all in a gulp. So, I implored her to please let me

off, that I hadn't done nothin', that I'd stick to Pard Wilson as a brother if she'd let me pursue my peaceful life up here away from the glitter of the world and the best man's job. But the gal wouldn't have it, an' I promised to come 'cause it ain't in me to refuse anything.

In some manner the news leaked out in Panther Mountain Camp that I was to be "Pard" Wilson's best man at the weddin' an' that's why the boys made an unnecessary call at my domicile on the evenin' when I was tryin' to get into that dress suit that had been sent me. Guess the express agent told on me. An my buddies—well, I reckon the good Lord made them, but I'll swear, that His stock of brains was runnin' low for every one of them brought a present that I was to give to Pard, an' what they didn't do to my dress suit! Tuds Finnigan touched his finger on the shirt, remarkin' that it looked whiter than snow, but as Tuds and water isn't on speakin' terms very often, why, I carried the spot on my bosom into town, also, all those packages. An' I wasn't as brave as a big man ought to be. I was out of my own circle. My own zone was bounded by over-alls, and here I was in a shirt that bulged out my center like a bustin' barrel, a dohickey of a necktie, a shiny plug hat set off by a coat that was a vest with two tails tacked on the rear, an' pants an' shoes to match the whole outfit. My feelin's were irritable. Doesn't a fellow have to suffer a lot for his friends, anyhow?

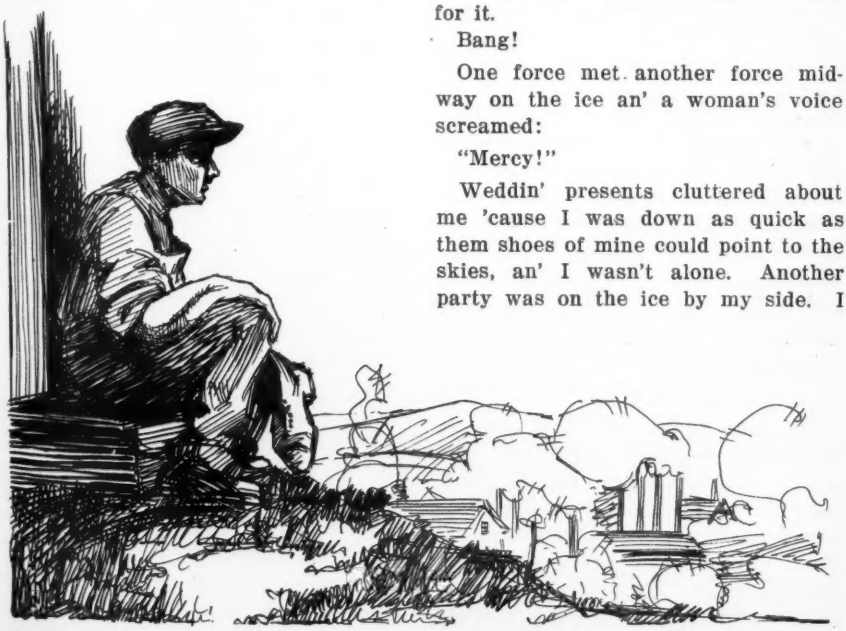
Flemingville nestled right in the shadow o' Panther Mountain. Ol' Jim Fleming, father of Pard's gal, owned that burg an' the coal mines on the mountain. Snow an' ice covered the street when I arrived. The sun hadn't got to it an'—how slippery it was under foot! My new shoes were like skates. They skidded in every direction. An' I was loaded down like a Santa Claus with Pard's weddin' presents. Thus I navigated. Spyin' a big sheet of smooth ice with an island of bare ground, I made a skatin' slide for it.

Bang!

One force met another force midway on the ice an' a woman's voice screamed:

"Mercy!"

Weddin' presents cluttered about me 'cause I was down as quick as them shoes of mine could point to the skies, an' I wasn't alone. Another party was on the ice by my side. I



knew it before I could raise up to a sittin' position because some furry thing had fallen over my face.

"Hello!"

Somehow that greetin' popped out of me my astonishment.

"How do you do!" said the young lady sittin' opposite me on the ice. She was grinnin' sort o' bewildered.

"Pretty good," was all I could reply for a second, and then I asked her if this was an introduction accordin' to rules or plumb carelessness on my part.

She laughed heartily. I liked her for it. She was a nice gal to take it that way, wasn't she?

"Won't you help me up, please?"

I had forgotten all about the cold fact that we were sittin' on the ice. That was impolite.

"Are you hurt?"

She didn't look injured but I asked anyhow because I didn't have anything else to say an' I held her so she wouldn't fall in case she had sprained a foot or somethin', but she answered by another peal of laughter, pointin' at the ice. I looked where her finger was aimin'. My hat! Its usefulness was gone. From the appearance of the wreck it had been spinnin' 'round on the ice when the gal of my quick acquaintance had landed on it kerplunk.

"That doesn't matter," was my gallant reply to her apologies. "I wish this whole outfit was busted like that hat, then I could go back where I belong and tell 'Pard' Wilson to get another best man."

"You're 'Pal' Hawkins?"

I agreed to the identity even in those clothes. But, just then, she saw the weddin' presents I'd been carryin' in from the boys up in camp. The wrappin' paper had been torn off. Judas! They were enough to make anyone laugh. Some were for the bride, and I reckon anyone can figure out what a rip-snortin' coal miner might buy for a woman that's real unappropriate.

That girl's laugh was nice and natural and I, Pal Hawkins, voted to myself that I was goin' to like her; but it was mighty unlucky that we had met when I wasn't dressed in my proper outfit of flannels and overalls 'cause in this best-man's rig I did honestly appear unhandsome.

She went one way an' I pulled straight ahead 'cause I couldn't find a thing to say an' then I wanted to be alone with my thoughts which were quite upset. After walkin' a long way, a man told me that to find Pard Wilson I'd have to go back to the same spot where I had bumped into the gal; but on returnin' I was more careful because I didn't want fate to introduce me to any more gals. One's plenty!

With bold determination I ambled in to Mr. Fleming's house where Pard's gal met me as radiant as sun kisses on wind-rippled water. An' Pard was there, too, an he gripped my hand an' laughed uproariously.

"That's all right, Pard," said I, "the fight's off till after the weddin'."

"Why?" stammered Pard, surprised.

"'Cause I'm done with mankind partners. You've broken my confidence in them. I'm goin' to find somebody that'll stick through thick an' thin."

"A woman," interrupted the gal, readin' me correctly. Don't it beat all how they can do it? Noddin' my head I continued:

"Pard, I know you. Who left me in my batchin' shanty up on ol' Panther Mountain? Who picked out a girl for me by the name of Hazel? What'll she look like? Bet she's growed like a turnip with a colony of copper freckles on her broad face! It's been one of your tricks to sic somebody on to me when I ain't in

fightin' trim. Look at me in this outfit! Ain't I some howlin' prize? That's how I appear when Fate hands me the girl I've been lookin' for all my life. If I'd not been lit up in this best-man's clothes, but had on my overalls an' flannel shirt, I'd made a hit with her."

Pard and his gal laughed as if I'd been funny and then somebody coughed,—a subdued cough from behind some portieres that I hadn't noticed before, an' out from them stepped my Fate girl,—the same one I had hit on the ice. Vaguely I heard Pard sayin':

"Miss Hazel Adlee."

He had played fair. For once he showed good sense by skippin' out of the room.

Three months later I was goin' to send Pard Wilson this telegram:

"You are forgiven. I'm hooked, too. Just had it done at the parsonage. We are off on our weddin' trip (Signed) Pal Hawkins."

I showed it to my new partner. She looked at it seriously, pretendin' to sit down on the arm of my chair—but, leave it to me, she didn't—still, that's neither here nor there.

"Pard's played you for fair."

"He has? How?" I asked.

"Listen," said my life partner. "Remember when Margaret came up to persuade you to be the best man? You do; well, if you handn't promised, she would have kissed you. Pard Wilson was looking through the window."

"O-o-oh!" That's all I could say in my astonishment. The vision of my predicament rose monstrously before my eyes. If it had happened, wouldn't Pard have had me? So that's why she was lookin' at the window.

"An', Pal, you don't know that he put me up to bumping into you on the ice—."

Pard an' me's due for another meetin' now.

Calling Producers to Account

New Oregon Sand and Gravel Law Is Being Violated

WHETHER through ignorance of the law or through indifference thereto, numerous sand and gravel companies operating in the navigable streams of Oregon are every day violating the state law, which forbids such operations without permission from the state land board, according to George G. Brown, clerk of the board.

The law, enacted by the special legislative session of 1920, requires that before any sand or gravel may be removed from a navigable stream the company must first make application to the board, which is authorized to sell the lease rights for a term of years after first advertising for bids. A minimum price of 10 cents per cubic yard has been adopted by the board for these lease rights, which are expected to bring several thousand dollars a year into the state's irreducible school fund.

Brown is not in a position to state just what action will be taken to bring these violators to task, except that he declares that all sand and gravel companies will be expected to account for their entire output from the date on which the law became effective and to reimburse the state for the same at the rate at which the lease rights in their respective sand and gravel beds are finally sold by the state land board.

All of the year 1920 will be required to complete the removal of the debris in the pits of the coal mines around Lens, France. The majority of the mines are flooded, due to the destruction of the machinery. Electric pumps are being installed and new cement shafts will be constructed. Two or three years will be needed to pump out all the water.

Lady Is Lime Manager

She Inherited the Job, And Is Making Good at It

ONE might easily think of a more desirable occupation for a lady than that of manager of a lime plant.

But as a matter of fact Miss Elfrieda H. Roth had little choice in the matter. The position of general manager of the Sheboygan Lime Works, Sheboygan, Wis., came down to her as a family inheritance, so to speak, and she has been working at it industriously for five years or more.

She seems to be making good at it, too, for hers is an increasingly going concern, as any business man in the town will tell you, and as evidenced by the fact that when last seen she was going over the blue prints of a new office building which her company will put up this season.

Now, of course, Miss Roth does not get out in overalls and superintend production at the plant; no, not even in these days when blue denim is coming into popularity. Neither does she appear at the office in the kind of clothing in which the camera caught her. During business hours her attire is appropriately neat, simple and inconspicuous.

You would think her a born business woman, to see her at her desk; and yet she is willing to tell you that she originally had no ambition to be such. Having had this responsibility thrust upon her, however, she was not the one to shirk, and in addition to performing the duties of general manager, she is secretary and treasurer of the company.

This company is purely a family affair, with Miss Roth's mother, Mrs. Henriette E. Roth, as president, though now too advanced in years to take much active responsibility in the business.

As lime manufacturers they represent the oldest plant in the state, it having been established by Henry E. Roth in 1854. The business was incorporated under its present name in 1885.

The company is well known throughout the county, state and Northwestern states for its Sheboygan white quicklime, which has maintained its standard of quality for sixty-five years.

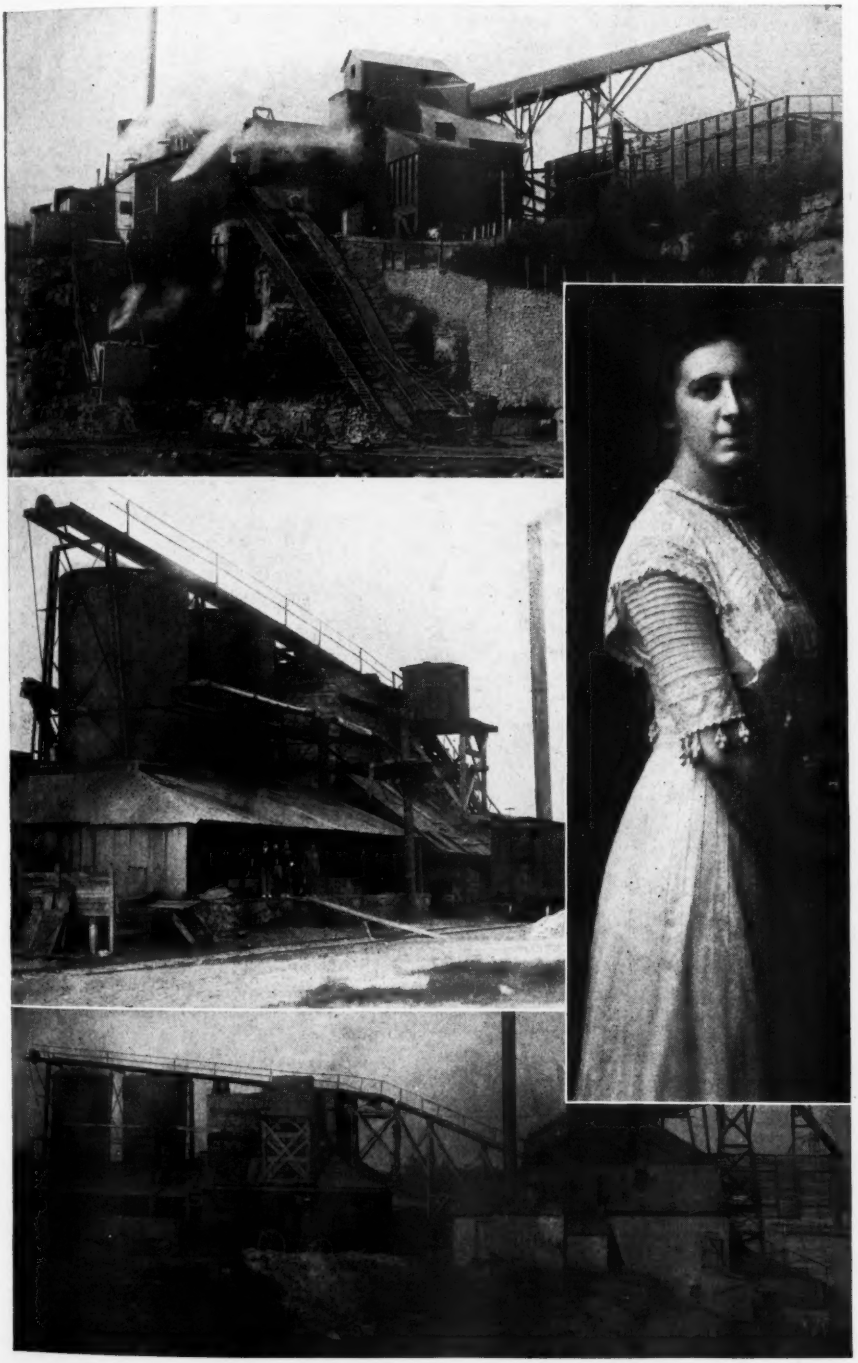
The crushed stone business has increased each year so that the company has been obliged to increase its storage space several times. Large quantities of crushed stone and crusher sand are sold in Sheboygan and to various Lake Shore cities and towns.

Besides being manufacturers the Sheboygan Lime Works are building material merchants with three yards in the city of Sheboygan and one at the quarry. At these yards everything in the building line, except lumber, is sold.

Miss Roth is a familiar figure at the meetings of the Wisconsin Mineral Aggregate Association and other building material organizations to which her company belongs.

A Boston syndicate, composed of John H. Messer, William P. Corcoran and Dexter B. Pattison, representing a capital stock of $150,000, has recently incorporated the Highland Sand & Gravel Company, Boston, Mass.

Columbus, Miss., has another enterprise added to the number of its industrial plants, the newcomer being the Columbus Gravel Company, which is a recent $150,000 incorporation for the purpose of developing the gravel lands of Henry Bowling, a few miles south of Columbus. The principals in this deal are C. G. Kershaw, of Birmingham, Ala.; E. H. Reeder, Greenville, Miss.; and W. Broadnas, of McAlester, Okla.



Sheyboygan Lime Works, and Miss Elfrieda H. Roth, Manager

PLYMOUTH

Gasoline Locomotives

Industrial Dictionary

PIT---A natural or artificial hole or cavity in the ground, especially when relatively wide and deep.

QUARRY---An excavation from which stone is taken for building or other purposes. Distinguished from mine by being widely open at top.

PLYMOUTH---An industrial locomotive manufactured at Plymouth, Ohio, and distinguished for its sturdy construction, its long life, and matchless service. Especially adapted to pit and quarry industries.

HAULAGE---An industrial problem especially acute under present conditions, but easily solved by the installation of a Plymouth Gasoline Locomotive.

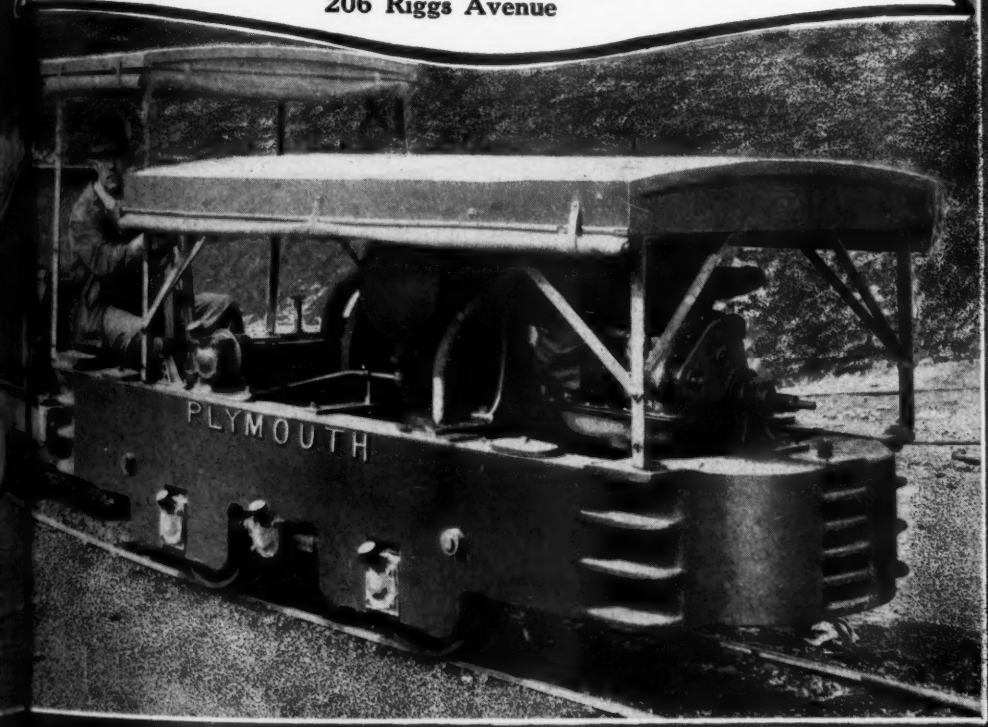
SATISFACTION---A feeling of relaxation and content, particularly enjoyed by Pit and Quarry owners who have shifted the haulage burden to the Plymouth Gasoline Locomotive.

RESEARCH---Digging after facts, particularly exemplified by those who write for Illustrated Bulletins on haulage, issued by

THE FATE-ROOT-HEATH CO.

PLYMOUTH, OHIO.

206 Riggs Avenue



Trucks Do 95 Per Cent of Hauling

San Francisco Now Fully Converted to This Method of Delivery

SOMETHING more than four years ago the people handling crushed rock, sand, gravel, cement, etc., in San Francisco, began to break away from the horse drawn vehicles in favor of the motor trucks. The city was late, perhaps, in adopting the motor truck because its hills were steep and the early trucks were not very successful in negotiating them. This, in turn, developed a very fine lot of horses; and when the auto truck finally proved itself, many horse users were loath to let the animals disappear. The city is still one of those handling large quantities of gravel, sand and like materials almost exclusively with horses.

One of the earliest to appreciate the value of the autotruck was the Bay Development Company. This company adopted this method of hauling about the city just five years ago. Gradually the company increased the number of its trucks, and other companies began to compete along the same line. The most important competitor was the Healy Tibbitts Company. In order to do away with duplication of effort it was finally decided that the trucking of these two companies should be under one control.

These associated companies now have fourteen Peerless trucks and handle about 75 per cent of the business in these lines in San Francisco. The rest of the business handled by auto trucks is in the hands of a few individuals, whose machines are of several makes. Altogether it is said that fully 95 per cent of the hauling of this nature in San Francisco is done by auto trucks.

Relief From Traffic Handicap

Louisville Producers Say It Is To Be Found in the Motor Truck

THE great problem with the stone and gravel people in Louisville, Ky., is to get cars and to get them moving. This problem is more serious with the stone crusher people than it is with the river sand and gravel people, because without at least 50 per cent supply of cars coming along with some regularity the quarries and crushing plants cannot operate.

Indicative of the stress here, R. B. Tyler has been trying to get his quarry and crushing plant into commission on the Southern railway near Louisville but he has been delayed aggravatingly by lack of cars. His normal requirements at this plant are from 10 to 12 cars a day and he must have something like half this number to justify operation. He says they have plenty of orders and they are in good shape to run. He has equipped his quarry with a pump and hydraulic system for stripping and expects to make a busy year of it if he can get cars to move the stuff.

At the Hodgensville plant, where he has some road contracts, Mr. Tyler is handling his crushed stone with motor trucks which gives him better control of operations. He is also operating some caterpillar tractors for grading, scraping and road construction work and getting some good service out of them as well as out of the motor trucks for hauling.

The River sand and gravel people started in the season with stocks clear down to almost bare yards and they find plenty of orders to keep them busy so they have to keep their diggers hustling to stock up their yards and supply their needs. Not only is there a good percentage of sand and gravel being used locally for structural purposes but the good roads work in the surrounding territory is creating car lot trade that is interesting. There are culvert and bridge jobs even when the road itself is not concrete and when concrete roads are made the river sand and gravel people come in strong. New road and street building in fact is proving a big item in the sand and gravel trade this year.

J. E. Lloyd, of the Louisville yard of the E. T. Slider Co., says they are being kept very busy all around and incidentally they are trying to improve the equipment on their yard and are constructing a new office building.

John Diebold and Sons Stone Co., which has a structural stone mill, report that they not only have plenty of work but they have calls for crushed stone which indicate a strong demand for this commodity which should keep all the quarries busy.

One plainly evident fact from the present situation of the trade here is that the stone people have to extend the use of motor trucks and reach out with them for somewhat longer hauls than has been considered practical in the past if they are to get relief from the transportation handicap. There is not much chance for the railroads, to get in shape to handle the traffic being offered for another year or two from present indications.

The Boyer Sand & Gravel Company, Woodbine, Iowa, has incorporated with a capital of $150,000, and will operate a pit on a 93-acre tract located south of Woodbine. A considerable portion of the land is owned by the company. The incorporators are F. L. Hupp and F. W. Barrett, both of Ozark, Missouri.

The St. Paul Stone Company of Hastings, Minn., has purchased the old McDermott tract across the river from Hastings and will extend the quarry operations there and start two rock crushers shortly.

Trucks Save the Day

Buffalo Depending on Them Almost Entirely During Switchmen's Strike

MOTOR trucks are saving the day in Buffalo at present for the sand and gravel business. With all freight shipments practically at a standstill, big five-ton trucks are being utilized for hauling building supplies of all kinds to the Tonawandas and other nearby points where contractors have building operations under way, but get their supplies from Buffalo concerns. In ordinary times materials are sent to these out-lying points in freight car shipments. At present, with the switchmen's strike in full blast, this is impossible and the motive way is filling the breach.

The old day methods of hauling such materials by horse power would not be able to cope with the present situation here. As it is, all the available trucks owned by the sand, gravel and other building material men, are being rushed to the limit to meet the demands of the contractors.

This, however, does not mean that any big building boom is on. Aside from several big plants which plan to build here this season, building is only normal as yet. But with all freight shipments stopped, even to surrounding cities, the normal business is sufficient to keep everyone busy.

Much of the rough supplies in the way of sand, gravel and crushed stone are brought into Buffalo by boat and usually the lake traffic has opened about this time of year. This year, however, so great is the ice-mass in Lake Erie that it stretches for miles from the harbor, and therefore shipments by lake are out of the question for some time yet—probably for ten days to two weeks.

One of the big building operations of the season here is the mammoth plant of the Dunlop Tire Company of England, which has incorporated in this country as Dunlop-America, Ltd. This plant will employ 5,000 men and ground was broken for its construction two weeks ago. Labor of all kinds has been very scarce here and is yet and all that can be secured is being grabbed up for this job on River road, at big wages.

The motor truck as a means of salvation is being grasped at by all construction men in the city at present. One of the principal sand and gravel concerns of the city, the Buffalo Gravel Corporation, has a fleet of thirteen 5-ton Pierce-Arrow trucks now rushed to the limit hauling supplies for contractors. D. Hyman, president of this corporation, reports a large number of orders on hand and business very encouraging were it not for the unauthorized rail strike.

Mr. Hyman also announces a general advance in prices of materials handled by the corporation, about May 1, but will not state what percentage the proposed advance will be at this date.

"As this is the age of concrete," he stated, "all delays to building, of whatever kind, affects our company and others of the kind severely. The present greatest one is the strike of the switchmen. Others are labor and money. Of the latter the labor situation seems in a fair way to improve and the banks here are very liberal in loaning money for all building operations."

Continuing, Mr. Hyman said:

"With reference to the gravel business for the month of April, would say that, owing to the switchmen's strike our car shipments have ceased. We have a large number of orders on hand and building operations are diminishing fast owing to the fact that the contractor cannot get the material that is shipped in by rail. Of course our trucks are busy delivering the material

where it is possible and the distance is not too great.

"At this time the value of motor trucks is very apparent. We are delivering a great deal of material by truck that otherwise would be delivered by rail. If we were operating with horses I do not know what we could accomplish at such a time as this, owing to the fact that the contractors have been educated for quick delivery, 5 tons instead of 3, and no congestion owing to a long line of teams at their jobs.

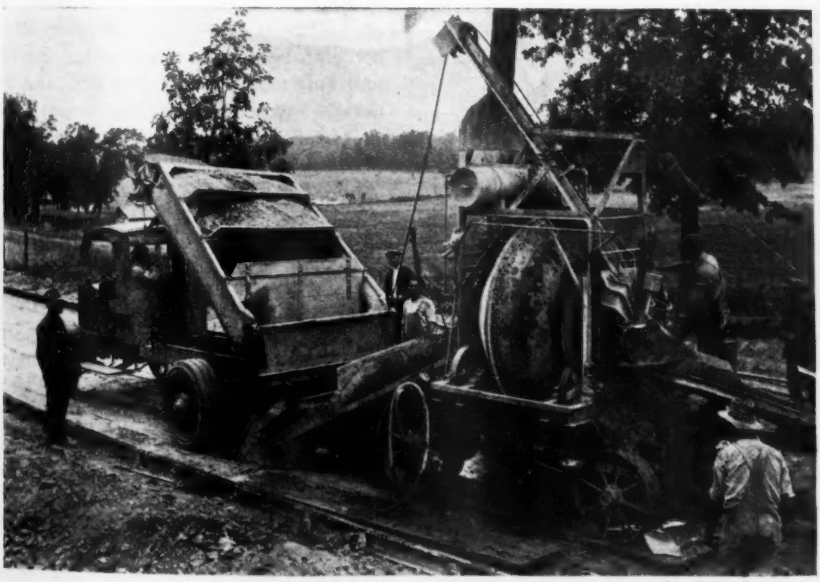
"The outlook, if it were not for the railroad strike, would be very encouraging. The laborers, as well as the mechanics, in this district, are a little more anxious to work than they have been for the last 60 days.

"The prices are the same as last month but will have to be advanced for the reason of the increased cost of fuel, labor and supplies. The advance we have not decided on, but we will have it effective about May 1st.

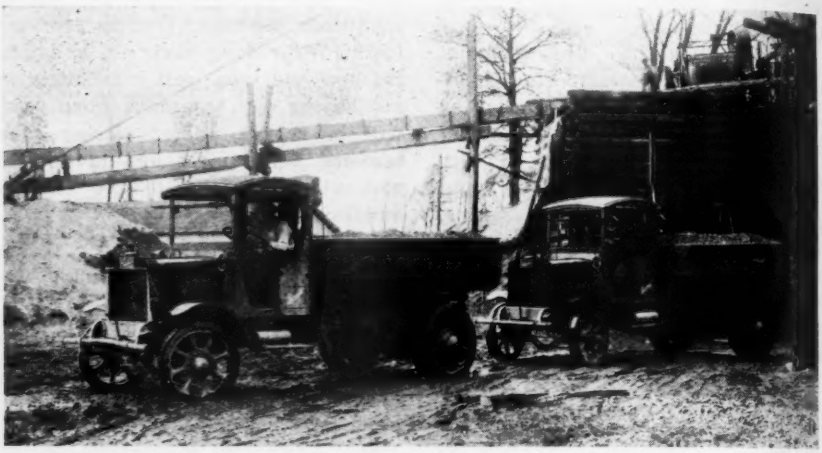
"There are several large building projects here in Buffalo contemplated which will go ahead just as soon as conditions warrant. Owners are very loath to tear down their old buildings for new and then wait indefinitely or not having any assurance when same will be rebuilt, thereby losing their incomes, while taxes and investment will add materially to the finished building."

April 1 saw the resumption of the season's operations at the plant of the Newaygo Portland Cement Company, Newaygo, Michigan. Last year's production was 406,000 barrels, while the sales for the same period were 483,000 barrels, so that the warehouses were practically empty at the close of the season. This year the company anticipates a largely increased production, and is adding more extensive storage facilities so as to enable the plant to operate several months longer than usual.

The Glacial Sand & Gravel Company, Zanesville, Ohio, have found their present capital inadequate to meet the needs of their growing business, and with that in view have increased their capitalization from $10,000 to $25,000.



Dump Body Divided in Four Parts, Each Holding a Batch for the Paving Mixer



Service Motor Trucks Used by Indianapolis Concern

Many Motor Truck Advantages

Indianapolis Gravel Producer Can Enumerate Them on All Fingers

ECONOMY of operation, convenience in loading and unloading, and the saving of expense, are only some of the reasons advanced by J. L. Alley, president of the Acme Gravel Company, Indianapolis, Ind., for using motor trucks instead of horse-drawn teams for city deliveries.

At the present time the entire output of the sand and gravel of the company is disposed of to contractors in Indianapolis, it being declared by Mr. Alley that it has not been necessary to ship his product, even though a railroad switch is on the property.

"By the use of trucks last winter," said Mr. Alley, "I was able to operate my plant during the most of the season and make deliveries in such manner that I am convinced this alone is responsible for the volume of business we are doing this spring. It is some considerable satisfaction to a contractor who is wanting to do some particular bit of construction during a short non-season period in the winter months, to have sand and gravel dumped on the job, at the time it should be there.

"Last winter we had such orders week after week, and because of trucks, we were able to make city deliveries promptly. The result is apparent to me. Contractors in Indianapolis have come to believe in our delivery system and rely upon it. We do not take orders we can not fill, but we do take more orders than we possibly could fill if we used the team and wagon.

"Let us begin with the start of the day's work and follow the truck through. When it is taken from the garage in the morning no time is wasted in currying, hitching, feeding, etc. When the truck is driven to the automatic loader, there is no congestion because the truck that may have preceeded it has only required about two minutes to be loaded and is gone. The truck is loaded, goes to the point of delivery in about one-tenth the time that would be required by a team, and is unloaded through the automatic dumping device. The truck comes back light in about one-fifteenth the time

required by a team of horses, and the process is repeated.

"I do about five times the amount of work with one truck that is done with one team."

At the present time, Mr. Alley employes five trucks in city delivery. He has a daily production of about 300 yards of gravel, all of which is disposed of in Indianapolis. He is beginning work, however, on a new plant adjoining his present plant at Kentucky avenue and Eagle Creek, which will have a capacity of more than 1,000 yards of gravel daily.

Even with the prospect of out-of-town deliveries, Mr. Alley is planing to use trucks for the shorter hauls instead of railroad transportation. By short hauls is meant hauls of 50 miles or less. He is of the opinion that such service will be nearly as cheap as railroad transportation and the increased service given the customer will more than pay in general satisfaction for any additional expense. With such an acute shortage of freight cars and with the congested condition of the railroads, coupled with an expected boost in freight rates, which boost no doubt will affect the sand and gravel industry, Mr. Alley is convinced that the motor truck will help him out of his transportation difficulties. Mr. Alley says that so long as his motor trucks continue to maintain their present rate of efficiency, he would not consider at all going back to the team and gravel wagon.

Cost of Evaporation

The cost of evaporation is usually stated as the cost of fuel required to evaporate 1,000 pounds of water from and at 212° F. To find it, multiply the price of coal per ton by 1,000 and divide the result by the product of the equivalent evaporation per pound of coal and the number of pounds in a ton.

Depreciation of River Equipment

How Much Do You Charge Off For This Item on Your Income Tax Returns?

THERE are so many things which affect the life of floating equipment that it is a difficult matter to arrive at any average percentage to charge off for depreciation.

This was touched upon by R. Snoddy of Des Moines, Iowa, before the convention of the National Association of Sand and Gravel Producers. He said:

"When this high cost of living was assisted by the income tax, in our first report we took 20 per cent depreciation on all of our river plant. As a matter of course that raised a question. There was considerable correspondence, and eventually a representative from the Dubuque office of the Internal Revenue Department called to check us up.

"I took him around in my car and showed him various plants, and told him how long they had stood. I took him to one man who had had his boat sunk in the ice gorge for three years hand running, the loss averaging $16,000 a year to this one concern as a result of the crushing of his boats and the undermining of his bins and stuff of that character by the ice gorges.

"Of course he was a particularly unfortunate fellow, but he served for an example.

"I was allowed the 20 per cent, all right, and have been taking it ever since."

The Moosic Sand Company, Thomas F. Walsh, proprietor, is a new corporation, which will do business at Moosic, Pa. Capital, $12,000.

Associate Membership Created

Indiana Transacts Other Business at Special Meeting

At a special meeting of the Indiana Sand and Gravel Producers Association held in Terre Haute early in April, an associate membership was created, whereby members in good standing in other state associations are eligible to membership in the Indiana association upon payment of $25.00 annually. This membership has the privilege of all meetings and benefits, but no vote.

Resolutions were passed favoring the 3 mill levy for State Highway Commission program, 6 per cent interest on road bonds, and the relief of county engineers by giving authority to the county commissioners to advance expenses of preliminary road surveys from general fund. It was voted to advocate the enactment of these recommendations in the event a special session of the General Assembly was called.

A progress report was made on the calculation of freight rate deductions and accepted. The discussion developed a need for additional data covering other commodities shipped or received by each producer. It was recommended therefore that further information, including freight bills and tariff reference concerning shipments of other commodities, be collected by the Association to be used at the proper time for comparison. Definite request for this information will be made later.

Williamsport, Pa., will have a new sand and gravel plant in the works of the Williamsport Sand & Gravel Company, which was recently incorporated by David N. Thomas, Jr., with a capital stock of $45,000.

Uniform Cost Sheet

Now Being Sent Out by National Crushed Stone Association

THE National Crushed Stone Association has agreed upon a uniform cost sheet, on which to secure information from the various plants, and these are now being distributed.

Each producer is supplied with two sheets, one to be returned to the office and the other to be kept by the producer himself.

Every precaution has been taken to make the information that is supplied strictly confidential. The producer is cautioned not to place his name on the sheet, and the sheet itself, when filled out, is put in an envelope, this being put into a larger envelope and addressed to the secretary of the association at Columbus. This larger envelope will have the name of the sender on the outside. When this reaches the office, the larger envelope is opened and the report is registered and given a number. This number is marked on the inner envelope, which contains the sealed report. The reports are sent thus sealed to the president of the association, Mr. John Rice, Easton, Pa., who groups and tabulates them.

This tabulation will be distributed to all who make reports, and no individual figures will be given out without the permission of the one sending them in.

The back of the cost sheet bears the following explanation for making out the data:

Fuel—Including coal, fuel oil, electricity and freight.

Labor—All pay roll or expenditures for labor at plant.

Material—All material entering into plant and equipment of all kinds, including office supplies, stable and all other purchases, including freight charges on such material.

HEADQUARTERS
NATIONAL CRUSHED STONE ASSOCIATION
405 HARTMAN BUILDING
COLUMBUS, OHIO
A. F. SANDLES, SEC'Y.

GROUP COST SHEET FOR 1919

Indicate Your Group by "X"

Make Separate Report for Each Plant.

Mark With "X" Group to Which You Belong.

☐ **Group A** Pennsylvania and Maryland and all States lying Northeast of them.

☐ **Group B** All States lying West of Pennsylvania, North of the Ohio and East of the Mississippi River.

☐ **Group C** All States lying South of Maryland, Pennsylvania and the Ohio River and East of the Mississippi River.

☐ **Group D** All States lying West of the Mississippi River.

☐ **Group E** Canada and Elsewhere.

What kind of Stone,—Limestone, Trap, Granite, Etc.....

"X" Total tons produced (run of crusher).....

"Y" Total tons sold.....

Number of Working Days.....

Is operation hand or steam shovel?.....

Is power steam or electrical?.....

	Based on "X"		Based on "Y"	
	Amount	Per Ton	Amount	Per Ton
Fuel				
Labor				
Material				
Explosives				
Depreciation				
General Expense				
TOTAL				

Read Explanation on Reverse Side

REMARKS:—

Explosives—Dynamite, blasting supplies, etc., and freight.

Depreciation—To include Royalty, Depreciation, Depletion, Obsolesence, Amortization, to equal 10 per cent of investment but not less than 10 cents per ton. (Run of Crusher.)

General Expense—All salaries and expenses of general administration, selling expenses, interest on borrowed money or bonds, insurance of all kinds carried, taxes of all kinds, reserves of all kinds carried.

Superintendents or clerks and office expenses at quarries NOT included, as these items are under items of Labor and Material.

If more than one plant is operated, pro rate this item according to the tonnage of each.

Notes of the Eastern Producers

Market and Other News From Our Special Correspondent

THE New York sand, gravel and crushed stone market shows increasing strength and activity. The definite opening of the spring building season, the settlement of various labor controversies, and the easing of the money market for construction loans, are bringing more stability to the situation; and this is something that is not only much desired by those in the trade, but absolutely essential if things are to go forward during the next months in the right way.

There is considerable road work looming in sight throughout the state and a heavy call for material in this line is anticipated by the producers and dealers. The spring weather and the breaking up of ice in the local rivers have brought decided relief in the matter of supply of sand and gravel; the threatened shortage did little more than make itself felt during a few weeks, and has now given way to regular shipments of material to the local market. Barges are arriving and discharging from day to day and there is little difficulty in finding ready purchasers; prevailing prices are having no effect on the demand, and advances are in sight. Crushed stone in wholesale quantities holds at the figures recorded in the last issue of Pit and Quarry; 1½-inch material is selling for $1.85 to $1.95 per cubic yard in cargo or carload lots, while ¾-inch size is quoted at $2.00 and $2.10 per cubic yard. Dealers are asking on an average of $3.50 a yard for this commodity. Gravel holds firmly at levels recently established, being $2.25 per cubic yard in carload lots for 1½ and ¾-inch sizes; dealers are selling this material delivered on the job at $3.50, first zone. Sand is operating under a keen call; the price is $1.25 per cubic yard in wholesale quantities, and $2.50 in commercial lots, delivered. This latter is a slight advance over the former quotation; accordingly to producers this price will hold until June 30, when further change may be necessary. Clean white sand shows no change, being quoted at $4.50 a cubic yard, delivered. Portland cement is now selling for $3.80 a barrel, having advanced from $3.40 early in April. The price of building stone remains at previous levels; Indiana limestone is selling for $1.55 per cubic foot, and Kentucky limestone, $1.75. North River bluestone is $1.50 per cubic foot.

The Young Sand & Gravel Corporation, New York, has been organized with a capital of $1,000,000, to operate as a producer of sand, gravel and crushed stone. The company is headed by A. R. Oakley, R. Van Voorhis, and W. E. Schiels, Jr., 153 Division Avenue, Brooklyn.

To specialize in the manufacture of sand and gravel conveying systems, the Demayo Engineering Corporation, New York, has been organized with a capital of $1,200,000. G. E. Coblens, F. Nelson and G. B. Holbert, 29 Broadway, head the company.

Producers in Northern New York report increasing operations, and the coming of the spring season has ushered in the opening of numerous properties which had to shut down during the cold weather. A new company has been formed at Geneva, to be known as the Geneva Stone Corporation, capitalized at $350,000; the company will produce crushed stone, gravel and kindred specialties, being headed by J. Parmenter, E. H. Palmer and I. Harris, all of Geneva. The Trenton Lime Co., Remsen (Oneida County), has been organized with a capital of $40,000 to manufacture lime and associated products. F. R. Brown, J.

Gallagher, Jr., and B. H. McCullom, all of Remsen, head the concern. At Buffalo, the Daigler Sand & Gravel Co., has increased its capital from $50,000 to $100,000 for proposed extensions in operations.

New Jersey operations in the sand, crushed stone and gravel field are coming along in good fashion, the one "blot" in the situation being the shortage of freight cars for material shipments. There does not seem any immediate relief in this regard, and no little concern is expressed in various quarters. Road work is receiving a prominent share of attention, and large quantities of stone, screenings and slag are being ordered for this service. The Lambertville Stone Quarry Co., Lambertville, has received contracts from the Flemington County Board of Freeholders for stone and screenings for operations in this district, while other orders for similar material have been placed by this Board with the Duquesne Slag Products Co., Dover, N. J., the Middle Valley Crushed Stone Co., Middle Valley, N. J., and the National Slag Co., Allentown, Pa. The prices for stone for this work run from $2.05 to $2.60 a ton, delivered; screenings from $1.75 to $2.05, and slag $1.95 to $2.30. The National Highway Material & Equipment Co., Trenton, N. J., is another active concern in this line and has booked some good sized orders for stone, slag, etc., for road work. The Board of Freeholders, Mercer County, has arranged to purchase stone to the amount of about $14,000 for immediate road construction.

All of the cement mills in the Lehigh Valley district of Pennsylvania are operating at the present time, but with the rapid accumulation of stocks due to freight congestion and car shortage, a curtailment of operations would not be surprising. Hundreds of cars, loaded and ready for shipment, have been laying on the sidings in this section during the past weeks, and some of the railroads recently have been placing live stock cars in service in these parts, lined with waterproof paper, for cement transportation. One of the first cement companies to decrease operations a little is the Coplay Cement Co., Coplay, discontinuing its night shift at the packing plant.

The Advance Supply Co., Charmain, near Waynesboro, Pa., manufacturer of gravel, grit, etc., has completed the erection of a number of new buildings at its properties to replace the structures destroyed by fire late last year. Operations have again been resumed and it is proposed to develop capacity output. Bruce Wills is superintendent.

The Newhard Crusher Co., Allentown, Pa., is being organized by a number of local men to operate a stone quarry in this section. The company will specialize in high grade crushed stone. The company is headed by Jonas H. Ackerman, George M. Sacks, J. Albert Schaeffer and Milton H. Bachman. Another new organization is the Williamsport Sand & Gravel Co., Williamsport, Pa., organized with a capital of $45,000 to operate a sand, gravel and crushed stone business. David N. Thomas, Jr., is treasurer of the company.

Owing to the keen call for material in the Pittsburgh, Pa., district, the Keystone Sand & Supply Co. is working double crews on a number of its sand diggers. The company will furnish large quantities of sand and gravel to the Pittsburgh Steel Co. at its Monessen works.

A new incorporation is the Trenton Lime Company, of Remsen, N. Y., capitalized at $40,000, by F. R. Brown, J. Gallagher, Jr., and B. H. McOllom, all Remsen business men.

Quarry Records

BY DANIEL J. HAUER.

WHAT records should be kept in a quarry? If it is the idea to obtain the cost of producing a unit of the product, the records need be very simple. A good set of books for all accounts, and a record of the production, would allow both the total and unit cost to be figured at any time.

Almost all quarry operators keep some such records. Many operators have a single form to keep a daily record upon. The payroll is kept, the amounts of various materials, such as explosives and coal, the number of tons of products or other units, and a few other items. In some cases these records are worked up into unit costs, or other deductions are made from them, while in most quarries these records are filed away and seldom referred to or used. Such records have some value. The fact that a record is kept, even if it is a poor one and not used, is generally a help; for men are inclined to do better work when they know that a record is kept of all they do. In fact, many men take a great pride in trying to beat their former records or those made by others.

Then, too, from such records it is always possible to analyze them and tell something of the total and unit field costs; and although these may not be complete, yet they are a means of making daily comparisons and this is some help in cutting out wastes and improving management.

Costs of any kind possess value, but the prime motive for keeping costs and other records should not be to obtain a vast collection of such data, but to have records that will allow better management to be installed and thus betterment continued until the greatest possible efficiency is obtained.

To do this the records must be of two kinds: those meant primarily to obtain costs and those to keep a record of materials used and on hand, for if supplies run short costs run up. For instance, if a blast is to be made and there is neither fuse or electrical exploders on hand, it means an extra cost for men to be idle while some is obtained, or if it does not cause a delay, then money will be spent to send a truck or messenger to obtain a temporary supply.

A daily labor cost kept as a pay roll cannot be of much value in detecting waste and bad management, so that such records should be divided up into each class of work that is done. It means easier and quicker comparisons and allows of all troubles being located easily. These records can all be kept upon one sheet of paper or a single form, as seems to be the preference amongst most quarry operators. The greatest objection to this is, not only the wasted paper and printing, due to many parts of the form not being filled up each day, the fact that each foreman or other man in charge does not make out his report of work done, but some one man must collect the information from these men and then fill out the report. To have men feel their responsibility and become interested in all they do, they should make their own reports in writing daily. Only recently the writer heard a man say, "Last summer when I began to make out these reports, I thought they were a nuisance, and for a long time cared little for the idea; but now I see where they were a great help to the company and a wonderful protection to me, for everything I did during the summer is recorded and no one can blame me for anything I did

or did not do, and the money I made is shown very plainly."

This man's interest was aroused not only by the work he did, but it was enhanced by the records he had kept and the reports he had made. In order to make intelligent reports he had to observe minutely and analyze his work and that of others. Thus each man in charge of certain parts of the quarry and mill work should make his own report. Thus if drilling is not done on some particular day a report is not made, unless it is considered necessary to complete the files.

The records for costs should cover each operation of the day. Thus there should be a record for the drilling. This should be kept so as to show the cost per lineal foot of hole and also per cubic yard or ton of rock loosened. The blasting should be kept to show the labor cost and also the cost of materials.

The breaking of boulders is another item. These costs should be upon the unit basis, as the ton or yard, whichever may be used. The total cost for a week or month with nothing to show the amount of work done will mean little.

The loading of the rock is another item. The hauling and weighing when it is done should be another item. The operation of the plant or mill should likewise be separate. The power plant should be included in this item, except that part included in the drilling costs.

So it should be for rehandling, storing and loading the product for sale. Each should be kept to show the total daily cost and also per unit.

Such reports that are used for materials, as explosives, coal, oil and many other supplies should show the amount of each received and the amount used. From such reports a stock record book can be kept showing at all times just what supplies and materials are on hand, inventories only being necessary to check up the book, thus keeping a record both of the stock and that used, information that will prove valuable.

With such records it will always be possible to segregate costs, analyze them and obtain the greatest benefits, not weeks and months afterwards, but immediately. Management will improve and there will spring up among the men a new interest in their work, that will cause them to do better and quicker work.

Looking for Candidates

National Lime Association Wants Head of Construction Department

AT THE April meeting of the Board of Directors of the National Lime Association in Philadelphia it was decided to appoint a head for the Construction Department of the association to take the place of Mr. N. G. Hough, resigned, just as soon as a suitable man can be found. A Committee on Organization consisting of Charles Warner, Wilmington, Delaware; B. L. McNulty, of Chicago, Illinois; C. I. Starrett, of Cleveland, Ohio, were authorized to look up suitable candidates and to make the appointment as soon as possible.

The requirements for this position are rather high. First of all the candidate should be a graduate engineer. In addition he should have had a number of years of practical experience in building construction and preferably also in research work touching the various types of construction material including lime plasters. He should be a man of a research type of mind. In addition, it is necessary that he have a breadth of grasp of business problems, openness of mind, and a personality that will enable him to work effectively with a wide range of persons.

Building Supply Industry in Canada

By W. A. McKAGUE

After the armistice was signed, building activity, which had been reduced to a minimum during the four years of war, greatly increased in Canada, and with this new demand for supplies, the production of stone, marble, gypsum, cement and other building materials again approached pre-war levels. The greatest demand for new construction came from manufacturing industry, practically all lines being quite unable to keep up with the orders. Very few new plants or extensions had been built during the war, but now that there was a prospect of increased labor supply, plenty of business, and more capital available, manufacturers went ahead with new programs. It is estimated that $50,000,000 of new United States capital was invested in Canada in this way in 1919, the exchange situation being one factor which encouraged American firms to invest the profits accruing from business already done here, and to transfer new capital to this country. The advantages of having branches in this country to secure the benefits of preferential tariffs within the British Empire were also apparent.

The construction of dwelling houses and apartments, stores, public buildings, theatres, etc., had also been nearly at a standstill during the war, and new demands for building supplies arose from this source. The financial condition of the railroads and public utility enterprises, on the other hand, prevented new extensions to these services, and there has not been much engineering work of any kind in Canada during the past two years.

The substantial increase in building operations last year is shown by the following totals of building permits for the 35 leading cities of the Dominion for the years 1913 to 1919:

1913	$153,662,842
1914	96,780,981
1915	33,566,749
1916	39,724,466
1917	33,936,426
1918	36,838,270
1919	77,113,413

So great has been the cost of materials during the past few months, however, that buiding operations have fallen off to some extent. The permits for thirty-five cities for January were $3,868,797, compared with $1,100,601 for January, 1919, and with $4,717,139 for December, 1919. The maximum was reached last September, the total for that month being $11,645,456.

In response to the greater demands the output of building materials in 1919 increased considerably. Gypsum to the amount of 306,947 tons was produced, compared with 152,287 tons in 1918, the values being $1,217,345 and $823,006 respectively. A comparison of the production of other structural materials and clay products is as follows:

	Quantity	Value
1918		
Cement, Portland.	3,591,481*	$7,076,503
Lime	6,353,951†	1,876,025
Sand and gravel..	11,262,282‡	2,367,018
Graite	.....	590,871
Limestone	.....	2,342,403
Marble	.....	550
Sandstone	.....	102,750
1919—		
Cement, Portland.	4,991,340*	$9,783,393
Lime	6,999,706†	2,268,432
Sand and gravel..	3,906,247‡	1,687,991
Granite	.....	968,111
Limestone	.....	2,708,625
Marble	.....	213,982
Sandstone	.....	78,327

The output of building materials in Nova Scotia, which has always played a prominent part in this industry, did not increase in 1919 in proportion to the total. This is largely due to the fact that new building and industrial

*Barrels.
†Bushels.
‡Tons.

development as a whole has not been so rapid in the maritime provinces.

The crude gypsum producing plants in the province, with the output for 1919, are: Wentworth Gypsum Co., Wentworth, 27,366 tons; Albert Parsons, Walton, 12,327 tons; Windsor Gypsum Co., Windsor, 7,500 tons; and the Iona Gypsum Co., Iona, 1,675 tons. The Dominion Iron and Steel Co. in its plants at Marble Mountain and George's River, produced 311,279 tons of limestone, and the Nova Scotia Steel and Coal Co. produced the remaining 42,100 tons at its Point Edward pant. The building stone is almost entirely produced by the Wallace Sandstone Quarries at Wallace.

During the past few months several new developments in the production of construction materials have taken place. The limestone deposits situated near the city of St. John, N. B., which are the best in that province, are to be still further utilized for commercial as well as for agricultural purposes. The provincial government has purchased a valuable property containing such deposits from H. G. S. Adams, of Brookville, N. B., and will erect a crushing plant. A survey of this property was made during the last week in March by the government. Another property at Torryburn, near St. John, is to be developed by Smith and Merrithew, who are now installing a plant with a capacity of 8 to 10 tons per hour. Through an arrangement completed on March 23, part of this firm's output will be purchased by the provincial government for agricultural purposes.

The plant and equipment of the Portland Rolling Mills, which have been in operation for a considerable time at St. John, N. B., has been purchased by Frank O. Garson, who for some years was connected with the Victoria Gypsum Mining Company of St. Ann's, N. B. Mr. Garson brings new American capital into the enterprise.

Whiting of a high grade, which has hitherto been obtained almost entirely from Britain, is to be placed on the market by the Manitoba Gypsum Company of Winnipeg. This is a valuable building material, and production is to commence within a few weeks.

The Dominion and provincial governments have been giving some attention to possible supplies of building materials. There is evidence that northern Manitoba, which is being opened up by railroad lines, and which is rapidly developing as a mineral producing area, also has extensive resources of this kind. Granite is available in large quantities, and of an excellent quality. There is, of course, very little local demand, but one large building, the Roman Catholic industrial school at Cross Lake, Man., was constructed out of this material. Extensive limestone deposits have also been surveyed, but no commercial use has thus far been made of them. Heavily bedded limestone is found at Cormorant Lake and Moose Lake, and at Dawson Bay, although in the case of the last mentioned the hardness of the stone would make it expensive to work. More thinly bedded deposits have been located along the Saskatchewan River and at Port Winkins, the latter being of such purity that it would produce an excellent grade of lime.

Cretaceous shales suitable for the manufacture of brick are found in the Pasquia Hills, Manitoba, though there is of course no demand for brick in that part of the province. The experience of manufacturers, moreover, has been that bricks made from cretaceous shales shrink greatly in drying, though this may be remedied by the admixture of suitable surface clays. The latter are widely distributed throughout the province, and samples have been found suitable for drain tile, especially by the addition of sand.

The Dominion government, through

its Department of Mines, is continuing investigation into limestone deposits in Ontario, and into sands and sandstones throughout eastern Canada. Through the road materials division of the department available road materials have been examined in several provinces, and these investigations have been followed up by extensive laboratory work. A survey for road materails recently completed by the Dominion government, near Regina, Sask., found glacial boulders, gravels and sand suitable for road surfacing. The supply of boulders is, however, small and widely distributed. Natural burnt clay deposits suitable for road surfacing were found near Estevan. The gravels and sand in the Regina district were found to be of good quality for road making purposes.

The total quantity of cement sold from Canadian cement mills in 1919 was 4,991,340 barrels, valued at $9,783,393, or an average of $1.96 per barrel, as compared with sales in 1918 of 3,591,481 barrels valued at $7,076,503, or an average of $1.97 per barrel; this is an increase in quantity of 1,399,859 barrels, or 39 per cent, and an increase in total value of $2,706,890, or 38.3 per cent.

The total quantity of cement made in 1919 was 4,600,738 barrels, as compared with 3,417,660 barrels made in 1918, an increase of 1,183,078 barrels, or 34.6 per cent. Stocks of cement on hand January 1, 1919, were 1,480,565 barrels, and at the end of the year this had been reduced to 1,080,764 barrels.

The exports of cement were valued in 1919 at $465,954, as against exports in 1918 valued at $13,752. Last year was, in fact, the first year in which the value of exports of cement from Canada greatly exceeded the imports. The quantity is not reported but assuming a price of $2 per barrel the quantity might be estimated at 232,977 barrels. The total imports of cement in 1919 were 49,232 cwt., equivalent to 14,066 barrels of 350 pounds each, valued at $51,314, or an average of $3.65 per barrel. This compares with imports in 1919 of 5,913 barrels valued at $19,851, or an average of $3.36 per barrel.

The consumption of cement in Canada in 1919 was therefore about 4,772,429 barrels. This is 1,175,035 greater than the consumption for 1918, which was 4,772,429 barrels.

Another Ontario cement company has just ceased operations. This is the Durham Cement Company, of Owen Sound, Ont. About twenty years ago there were more cement companies located around the south end of Georgian Bay than in the whole of the rest of Canada. There was one at Orangeville, one at Durham, one at Hanover, one at Wiarton, one at Shallow Lake, and three at Owen Sound. The only one now in operation in this district is the one at Hanover. The using up of raw materials has been the cause of these plants closing down. The Durham Company is also in bad financial condition, and owes its bankers $400,000.

Heating Surface

The heating surface of a boiler is the surface of metal exposed to the fire or hot gases on one side and to water on the other side. Thus, the internal surface of the tubes of a fire-tube boiler is the heating surface of the tubes, but the outside surface of the tubes of a water-tube boiler is the heating surface of those tubes. In addition to the tubes, all other surfaces which have hot gases on one side and water on the other must be taken into account. For instance, in a fire-tube boiler from one-half to two-thirds of the shell (depending on how the boiler is set) acts as heating surface. In addition to this, the surface presented by both heads, below the water level, has to be computed. The heating surface of each head is equal to two-thirds its area minus the total area of the holes cut away to receive the tubes.

Developing Lime Plant in Oregon

Big Company Incorporated to Develop Deposit at Orofino

AFTER lying idle for some years the lime deposit at Orofino, Oregon, is being opened up and work has started on a new plant. According to an official statement, virtually all of the funds to finance operations have been subscribed and the machinery ordered.

Benjamin R. Schmid, secretary-treasurer of the Orofino club and cashier of the Fidelity State bank, says:

"The plans call for a $100,000 plant. There will be a rotary kiln of the latest design, with a daily capacity of 125 tons. This kiln will be 180 feet long, with oil burners, fed under pressure, all controlled by thermostat, giving a positive and uniform temperature that insures an even and always uniform product.

"There will be a Kritzer type hydrater and a Raymond Bros. impact pulverizer. At the mine, 750 feet up the hill back of the kiln, a big steam shovel will dig into the mountain and supply the raw material.

"Another feature of the new equipment will be a complete mill for manufacture of lime fertilizer, a product that has come to be recognized in the agricultural world as of the greatest value in crop production. Both the University of Idaho and Washington State college have tested the Orofino product and are giving the new company every possible encouragement. Commercial lime fertilizer will be one of the chief products of the plant.

"To interest capital, the promoter, Ben L. Schultz of Lewiston has had the Orofino deposit examined by some of the best geologists and most competent lime experts. United States chemists, after many tests, have certified that the Orofino lime deposit, when properly calcined, is of the highest grade.

"The Orofino plant, according to Mr. Schultz, will be ready for operation by June 1, and will employ regularly from 20 to 25 men.

"The company is incorporated for $100,000. The incorporators are: Ben L. Schultz, president; Eliot Richardson, Pomeroy, Wash., vice president, and Edwin G. McFarlane, Lewiston, secretary-treasurer. The name of the concern is the Crystaline Lime company."

Wage Schedules

COST of production is a topic of never ending interest; and one of the big items in this cost is that of labor.

So wage schedules are being given careful scrutiny.

Some of the associations are collecting such data from their members, and more might do so to good advantage.

These pages are open for a discussion of the subject, too.

Rates on Glass Sand

A finding of unreasonableness and an award of reparation have been made in an opinion by the Interstate Commerce Commission as to rates on glass sand from Ottawa, Ill., and points grouped therewith, to Huntington and West Huntington, W. Va., between November 1, 1917, and October 17, 1918. The rates found to be reasonable are $2,40, $2,80 and $3 per ton. The varying rates are due to the increases allowed by the Commission and General Order No. 28. Under the latter order the rates went as high as $4,40 a ton, but they were subsequently reduced to enable Huntington glass manufacturers to meet the competition of producing points north of the Ohio River.

New Issues of Stock by U. S. Gypsum

Will Reincorporate in Illinois—Formerly a New Jersey Corporation

THE United States Gypsum Company, with headquarters in Chicago, will reincorporate and recapitalize under the laws of Illinois. The capitalization will be increased from $10,000,000 to $18,00,000. Approximately 90 per cent of the stockholders have given assent to the plan, which will be put into effect in the near future.

The company now has $6,000,000 preferred and $4,000,000 common stock, both of $100 par value.

Under the recapitalization plan there will be $10,000,000 preferred, part of which will be exchanged share for share for old preferred, and 400,000 shares of common stock, either $20 par or no par value, representing $8,000,000. The new common stock will be exchanged five shares for one of old common.

This exchange of stocks will leave $4,000,000 each of new preferred and common stocks unissued, which will be offered to stockholders pro rata and sold from time to time as more working capital is needed.

"The principal office of the company is in Chicago," President Sewell L. Avery said, "The new Illinois corporation law is more liberal, and it will be decidedly to our advantage to be incorporated under the laws of the state where our principal place of business is located, and from which our activities are largely directed. The company originally was incorporated under the laws of New Jersey."

Committee Organized

The Traffic Committee of the National Crushed Stone Association is organized and at work. At the Louisville convention Mr. P. C. Hodges, of the Marble Cliff Quarries Company, Columbus, Ohio, was made chairman with power to select his associates. Mr. Hodges invited a number of operators to suggest names for his committee, and the following were reported to him:

Alexander Harris, Holston Quarry Company, Knoxville, Tenn.; W. R. Stobie, Columbia Quarry Co., St. Louis, Mo.; L. J. Boxley, W. W. Boxley & Co., Roanoke, Va.; E. E. Mann, France Stone Company, Toledo, Ohio.

Efficiency of Various Prime Movers

Rated according to their efficiency, the locomotive stands at the bottom with an average efficiency of 6 per cent, followed by the compound noncondensing engine, 10 per cent; the compound condensing engine, including boiler, 13 per cent, and the Parsons turbine, including the boiler, 17 per cent. When we come to the internal combustion engine there is a decided jump. The automobile motor is credited with 23 per cent, the airplane motor with 27 per cent, the coal gas stationery engine with 30 per cent, and the average Diesel engine with 34 per cent. On reaching that modern development in which the internal combustion and the steam engine are combined, we get for the Still engine an efficiency (actually obtained) of 41 per cent, and Dr. Dawson sets down the probable future efficiency of the Still-Diesel combination at 44.5 per cent.—Chicago Daily Journal.

The Quaker City Rubber Company, Chicago, has secured Mr. Wm. S. Bloomer to represent it as Chicago district manager. Mr. Bloomer has had a long and intimate connection with the rubber trade and has a wide following of friends in the Central States and along the Pacific Coast as far as Alaska.

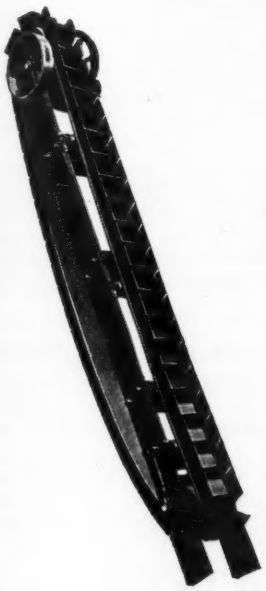
Elevating, Conveying

and

Power Transmitting MACHINERY

for

Gravel, Sand and Stone Plants



SCREW AND BELT CONVEYORS.

BUCKET ELEVATORS, with buckets on chain or belt, furnished with or without steel casings.

BUCKETS—standard types in steel or malleable iron, steel buckets of special design made to your specifications.

GEARS—MACHINE MOLDED or with CUT TEETH.

CHILLED RIM SPROCKETS.

CHAIN—standard malleable detachable, Ley bushel, steel or malleable roller.

SHAFTING, PULLEYS, BEARINGS, FRICTION CLUTCHES.

Send for Catalogue No. 38

H. W. CALDWELL & SON CO.

CHICAGO

Western Ave., 17th and 18th Sts.

Rates on Crushed Stone

Assistant Chief Examiner Robert E. Quirk, in a tentative report on No. 11,000, Lehigh Portland Cement Company vs. B. & O. and the Director-General, has recommended a holding that rates exacted by the B. & O. on crushed stone, intrastate, from the quarries to the cement mills, at Mitchell, Ind., were unjust and unreasonable to the extent that they exceeded ten cents a ton when hauled in cars owned by the complainant and fifteen cents when hauled in cars belonging to the railroad company, and that reparation should be made.

The rates involved in this complaint were the kinkiest of the kinks caused by General Order No. 28. The cement company had been paying $17.50 a day for the movement of stone from the quarries to the cement mill, the movement amounting to about twenty cars a day. The quarries are on a branch of the B. & O. near Mitchell and the cement mill is at Mitchell. Literal application of General Order No. 28 brought the cost per day to more than $300. The record did not disclose that much traffic moved after the cost became so high. The Railroad Administration almost immediately made a revision. A traffic committee recommended a charge of ten cents in cars owned by the shipper and fifteen cents in cars owned by the carrier, but the Director-General did not follow the recommendation. Instead he prescribed rates five cents a ton higher. The cars of the complainant are 50-ton capacity equipment and it is always loaded to capacity.

In asking for rates lower than the ones recommended by Quirk the complainant suggested that the B. & O. obtained its profit on the outbound movement and that the hauling of the stone to the mills was in the nature of a transit. Quirk said that that was an unsound contention, because the service has none of the characteristics of transit and because a carrier is entitled to a reasonable return upon the fair value of the property devoted to the service, even on a branch line. Quirk did not assert that the rates recommended by him would afford such a return, but that in comparison with rates on stone in that part of the country he considered them relatively reasonable.

The recommendation does not go to the extent of suggesting that the Commission can order a reduction in the rates for the future. It goes only to the extent of suggesting reparation on shipments during federal control. If adopted, however, it will open the way for the Indiana commission to reduce the rates and obtain permission from the federal body for making the lower rates operative.—Traffic World.

Barber-Greene Branches

Owing to their rapidly growing business, the Barber-Greene Company, of Aurora, Ill., have been obliged to expand considerably, making additions and changes in their selling force, as a result of which they are now represented in other cities by the following:

St. Louis, by R. E. Foulke, 404 Third National Bank Building.

Pittsburgh, J. A. Gurney, 605-606 Arrott Building.

Philadelphia, F. S. Sawyer, 1010 Penn Square Building.

Indianapolis, W. T. MacDonald, 305 Merchants Bank Building.

These are direct Barber-Greene branches and the representatives are experienced engineers, well qualified to furnish real service and engineering advice to all individuals and firms having material handling problems.

Cars and Car Wheels

A valuable catalog on industrial cars and car wheels is published by Hockensmith Wheel & Mine Car Company.

This company is making a specialty of Eureka wheels, which are fully described in the catalog, and have many advantages over the ordinary wheels.

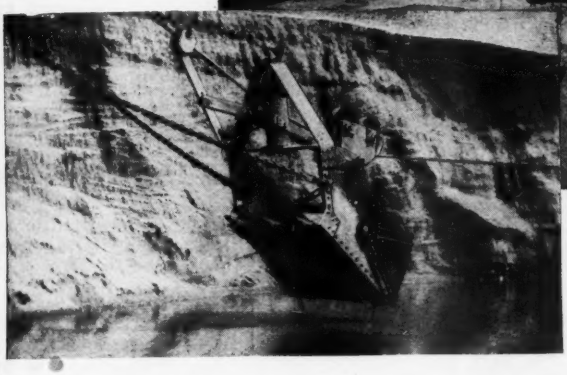
The Hockensmith cars may be equipped with these wheels, or with any one of several other types which the company makes.

Drill Sharpener

A new machine for sharpening well drills has just been completed by the Wood Drill Works, Paterson, N. J.

This machine will sharpen a drill in about five minutes, makes a cleaner, neater and truer job than can be hoped by the use of sledge hammers.

Empty Bucket Running Down



Loaded Bucket Coming Up.

Link-Belt Cable Way Excavators

THE Improved Link-Belt Drag Line Excavator is a shovel, conveyor and elevator combined—controlled and operated by one man.

It digs as readily from below water as in the dry, and is especially adapted to sand and gravel plants.

We furnish complete outfits including mast fittings, blocks and cables. Send for our catalog.

LINK-BELT COMPANY

Philadelphia, Hunting Park Ave. and P. & R. Ry.

Offices in all principal cities

LINK-BELT

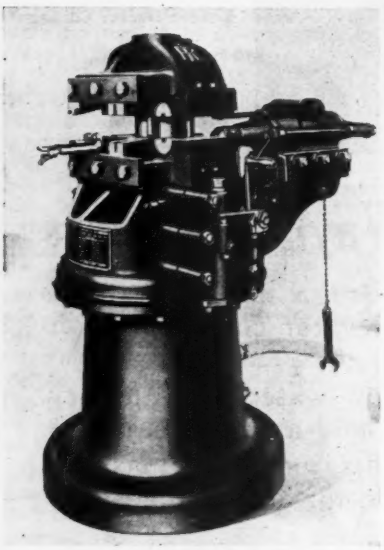
Sand and Gravel Plants

New Drill Steel Sharpener

A new air-operated drill steel sharpener, known as the I-R No. 50 sharpener, has been devoloped by the Ingersoll-Rand Company, 11 Broadway, New York.

This sharpener was designed primarily to rapidly and exactly sharpen and shank drill steel, such as cruciform steel up to 2 inches in diameter or round, hexagon, octagon, quarter-octagon, auger or spiral steel up to 1⅞ inches in diameter. When fitted with special devices it will forge bolt-heads, pins, stanchions, etc., in fact nearly two hundred different products have been made by this machine.

The single lever, which controls all of the operations of the machine, is



fitted with a safety locking device. This prevents accidents due to the impossibility of operating the machine unless the lock is released—an excellent improvement. The throttle valve is of the balanced spool type, operates easily and quickly, is positive and instantaneous in its action.

The hammer cylinder is an improved valveless type of hammer drill cylinder. This construction permits the free moving hammer to deliver exceedingly fast and powerful blows against the end of the dolly upsetting the steel and so forming the bits and shanks with extreme rapidity.

Good Siren Requisites

O. S. Burke, manager of the siren department of the Federal Electric Company, Lake and Desplaines streets, Chicago, states that in designing the Federal siren, the company has set out to meet successfully six requisites of a good fire warning, blasting signal, start and stop signal, or superintendent's call. These six requisites he outlines as follows:

1. A signal that can be heard unmistakably for the necessary distance.

2. It should be ready for use any second of the day or night, without a moment's delay.

3. It should be inexpensive in regard to maintenance cost.

4. It should give years of satisfactory service.

5. It should require very little attention and be practically free from any necessity of repairing.

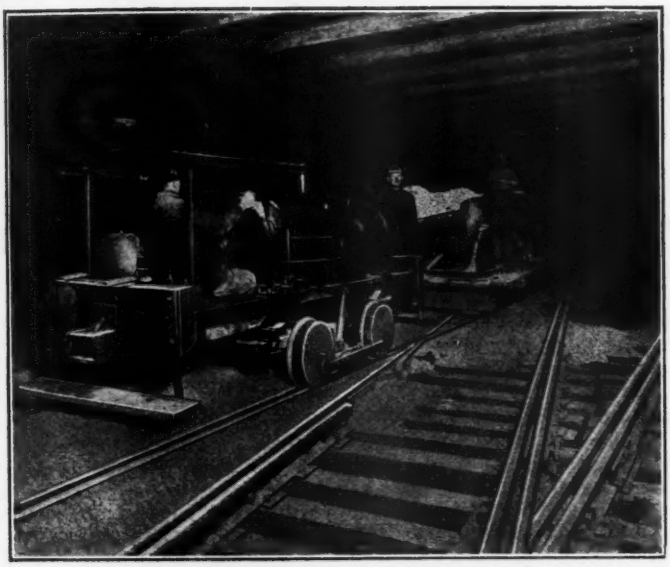
6. It should be easy to install.

The Federal electric siren can be instantly operated by the touch of a button or buttons, which may be located at the telephone office or office of the quarry, or at different points throughout the quarry according to special need of the siren. The instant accessibility is a very big feature of the Federal electric siren—its weird penetrating unearthly cry raging from a rumbling groan to a high shriek gets instant attention of the men for whom the signal is intended. The cost of the upkeep of the Federal electric siren averages only about $2.00 per year for electricity.

At the annual meeting of the Midwest Forge & Steel Co., East St. Louis, Ill., the following new officers were elected: J. W. Eschenbrenner, president and treasurer; C. T. Coates, vice-president and general manager; E. A. Eschenbrenner, secretary. The business was established in 1885, and for the past five years has been specializing in cement mill and mine forgings particularly grinding plates and steel balls.

The Locomotive Crane Company of America have removed from Thirty-sixth street and Ashland avenue, Chicago, to their new plant at Champaign, Illinois, and all communications are to be addressed to the new address.

The New York City Authorities Had Prescribed a Date by Which They Desired the New York Subways Finished—



Bell 7-Ton Oil Burning Steam Geared Locomotive in operation on New York Subway construction.

Engel & Hevenor, New York Contractors, say of their part in the Enterprise:

". . . our two seven-ton Bell Locomotives had to work consistently for practically two years and during the last two months, twenty-four hours per day . . . We only finished the day before our time was up.

"These two Bell Locomotives lived up to all claims made by you and more. They are reliable, economical and productive."

Bell Locomotives of the steam—oil burning—geared type are built in sizes of 3 to 20 tons capacity and for gauges of 18 inches or over.

They are ruggedly built with parts readily accessible and interchangeable, light in weight but powerful in tractive effect.

They burn kerosene, fuel oil, distillate or any other freely flowing oil without change of burner. Flexible frame construction and low center of gravity permits speed over rough and uneven track and roadbed.

Correspondence invited.

BELL LOCOMOTIVE WORKS, Inc. 23 Water St., NEW YORK

Recent Patents

The following patents of interest to readers of this journal recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trademark attorney, Continental Trust Building, Washington, D. C., at the rate of 20 cents each. State number of patent and name of inventor when ordering.

1,333,597. Dust-removing device for granite-surfacing machines. Charles S. Alford and Orlando Lombard, Wausau, Wis.

1,333,627. Apparatus for mining purposes. Edmund C. Morgan, New York, N. Y.

1,333,727. Crusher. Theodore F. Philippi, East St. Louis, Ill.

1,333,852. Tooth construction for digging-buckets. John W. Kittredge, Akron, Ohio.

1,333,921. Mine-shaft safety device. George M. Johnson, McDonald, Pa.

1,334,284. Rock-drill and like machine. George Constantinesco, Weybridge, England.

1,334,632. Rotary rock-drill bit. Rowland O. Pickin, Seattle, Wash.

1,334,894. Apparatus for and method of mining. Lewis H. Eichelberger, Plainfield, N. J., and Raymond A. Walter, Frostburg, Md., assignors to Ransome Concrete Machinery Co., New York, N. Y.

1,335,269. Two-compartment ball-mill. John R. Ball, Durango, Colo.

1,335,723. Tunneling-machine. Le Roy W. Campbell, Grand Rapids, Mich.

1,336,015. Gyratory crusher. Richard Bernhard, Allentown, Pa., assignor to Traylor Engineering & Mfg. Co., same place.

1,336,039. Coal-mining machine. George McCarter, Denver, Colo.

1,336,440. Slabbing and loading machine (mining-machine). Edward O'Toole, Gary, W. Va.

1,336,576. Method of producing digging-teeth. Wesley G. Nichols, Chicago Heights, Ill., assignor to American Manganese Steel Co., Chicago, Ill.

1,336,595. Excavator-bucket cleaner. Charles E. Stahl, Winthrop Harbor, Ill., assignor to Frederick C. Austin, Chicago, Ill.

1,336,657. Cutter for excavators. Valdemar Schmidt, Los Angeles, Cal.

1,336,927. Cutter-bar and bit-chain for mining-machines. Ellis T. Silvius, Indianapolis, Ind.

1,336,930. Rock-drill seating and controlling means. Harold I. Stage, Denver, Colo.

1,336,942. Stone-profiling machine. Elroy A. Chase, Northfield, Vt., assignor to Phillips & Slack, Inc., same place.

1,337,048. Mechanism for operating the reels of mine-locomotives. Frank B. Deans, Sharon Hill, and Benjamin K. Kirk, Philadelphia, Pa., assignors to Baldwin Locomotive Works, Philadelphia, Pa.

New Hand Pump Fire Extinguisher

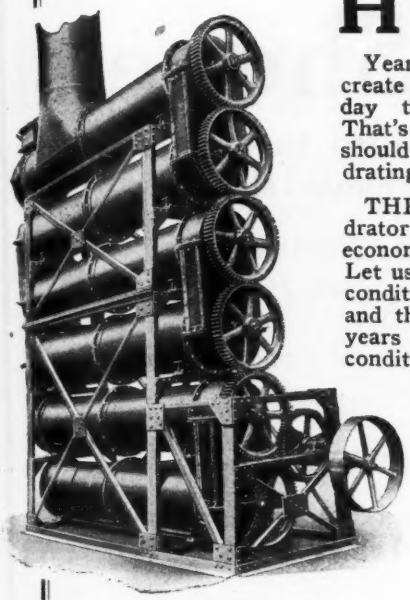
A new hand pump fire extinguisher for incipient fires is being handled by the Chicago agency of Frederick A. Watkins, 565 W. Washington Blvd. The design is in the form of a cylindrical container, which encloses a double-acting liquid pump, hand operated. This pump is positively double-acting—from the first stroke until the container is absolutely empty. This overcomes the great defect found in other guns whose pumps are most efficient when the gun is full.

In this new gun, which is called Fire Gun, there is no sputtering or spraying due to entrained air, but a solid stream of fluid of from 30 to 40 feet is discharged at each pump stroke.

It is built to stand rough usage—all parts are strong and the heavy gauge container protecting the pump mechanism is of the highest grade construction, the parts being die casted and accurately fitted to stand years of wear. The container holds 1¼ quarts of fluid. The reliability of the pump and the speed with which the gun may be emptied makes Fire Gun particularly effective.

The fluid used in the gun is more effective than water—it forms, upon striking the heat of the fire, a heavy blanket of non-combustible gas which cuts off the oxygen and puts out the fire. It is, therefore, especially effective on burning liquids, and, being a non-conductor of electricity, it may be used with safety in the case of electrical fires. Further, the fluid will not freeze at temperatures far below zero, and will not damage machinery, etc.

The gun is easy to operate and recharge—recharging requiring only the unscrewing of cap at the top and pouring in the fluid.



"THE KRITZER WAY"

HYDRATE

Years ago we helped our customers create a demand for their hydrate. Today the demand exceeds the supply. That's why every lime manufacturer should have an efficient, economical hydrating plant.

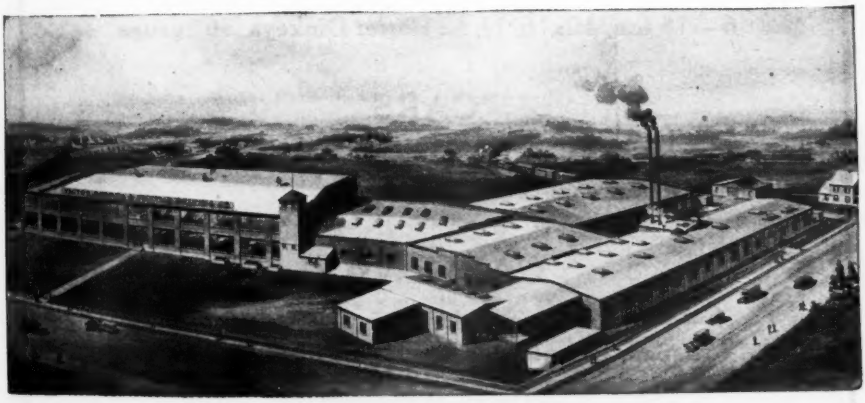
THE KRITZER Continuous Lime Hydrator is efficient in production and economical in operation and maintenance. Let us investigate exhaustively the local conditions peculiar to your proposition, and then apply our experience of many years and design a plant to meet those conditions.

A KRITZER plant, scientifically adapted to your conditions will give you the best product at lowest cost.

The Kritzer Company

503 S. Jefferson St.

Chicago, Ill.



Factory Behind the Product
Belting for Driving and Conveying

"V-B" (Victor Balata)

"Ampere" Canvas Stitched

"Grip-On" Impregnated Solid Woven

Victor Balata & Textile Belting Co.

Main Sales Office: 38 Murray St., New York City

Boston	Cincinnati	Chicago	Factories
85 Purchase St.	212 E. 2nd St.	167 N. Market St.	Easton, Pa.

Steam Shovels

Special attention is called to the following thoroughly overhauled shovels.

1—Model 0 Thew, shop number 1084.

2—Marion 60 Steam Shovels with 2½ yard dipper, Shop Nos. 1995 and 2059.

1—Model 70 Marion, 2½ yard dipper, shop number 2693.

LOCOMOTIVES

1—60 ton, 18x24, six wheel Switching Locomotive, standard gauge, 150-lb. pressure, INTERSTATE Certificate.

1—36 ton, 14x20, H. K. Porter Saddle Tank Locomotive, standard gauge.

6—18 ton, 10x16, H. K. Porter Dinkeys, 36″ gauge.

CARS

30—12 yard capacity Western, standard gauge air dump cars, 26′ beds.

CABLEWAY

1—3 ton capacity Lidgerwood Cableway 1164′ span, complete with Lidgerwood 9x10 Cableway engine.

In addition to the above, we have a large stock of contractors' construction equipment of various classes.

H. Kleinhans Company Union Arcade, Pittsburgh, Pa.

EFFICIENCY

RELIABILITY **READING** CO-OPERATION

Your Inquiries Solicited

SERVICE

Estimates Given Cheerfully

New — Used — Rebuilt
Machinery and Supplies
FOR
Construction and Industrial Work

Steam Shovels

1—Erie, type "A", ½ cu. yd. dipper, on traction wheels, full revolving. boom lowering device. New 1919, 3 months' use.
1—Erie, type "B", ¾ cu. yd. dipper, on traction wheels, full revolving.
1—Thew, type "O", ⅝ cu. yd. dipper, on traction wheels, full revolving, horizontal crowding boom.
1—Bucyrus, "18-B", ⅞ cu. yd. dipper, on traction wheels, full revolving.
1—Marion-Osgood, type 18, ¾ yd. dipper, on traction wheels, full revolving.
1—Marion, Model 20, Shop No. 922, 1 cu yd. dipper, mounted on standard gauge railway trucks.
1—Marion, Model 40, Shop No. 1865, 1½ cu. yd. dipper, mounted on standard gauge railway trucks.
1—Bucyrus, 70-C, Shop No. 1685, 2½ cu. yd. dipper, mounted on standard gauge railway trucks.

Cars

17—1 cu. yd. "V" body, all steel, 2 way dump, 36" gauge.
25—4 cu. yd. K. & J., 2 way dump, 36" gauge.
75—4 cu. yd. Western, 2 way dump, 36" gauge.
8—6 cu yd. Western, 2 way dump, standard gauge.
15—12 cu. yd. Western, 2 way dump, standard gauge.

Locomotives

1—Baldwin, consolidation, type 2-8-0, 8 drivers 44" centers, 20"x24" cyls., 107,000 lbs. on drivers; 8 wheel tender; 9½" air pump; tractive force 22,000 lbs. Now working, will be released shortly from lease.
1—Pittsburgh, Saddle tank, 4-38" drivers, 14"x24" cyls., steam brakes, standard gauge.
3—Porter, Saddle tank, 4 wheel; 9"x14" cyls., 36" gauge.
1—Vulcan, Saddle tank, 4 wheel; 9"x14" cyls., 36" gauge.
2—Plymouth, 4 wheels, friction drive, 3 ton, 4 cyl., gasoline engines, 36" gauge.

Crushing Rolls

1—Set of Traylor, type "AA" Heavy Duty Crushing Rolls, 42"x16", new 4 years ago, used only few months, in perfect working condition, will sell for almost one-half the new price. This is a particular bargain.

The above is a partial list of our plant, we also have a general line of equipment and probably what you need. Write us.

Reading Engineering Co., Inc.
Tribune Building **New York, N. Y.**

MARSH'S
Quarry Specialties
GUARANTEED

BUCKETS

1—1 yd. Orange Peel	$ 300
1—1-yd. Dragline, Page	300
2—1-yd. Concrete at $50 each	100
1—1½-yd. McMyler (new)	500
3—2-yd. Brown Hoist at $500 each.	1,500

BOILERS

1—200 H.P. Scotch Marine	2,000
1— 30 H.P. Upright	200
1— 15 H.P. Upright	100
1— 60 H.P. Upright	800
1— 50 H.P. Upright	700
2— 60 H.P. Erie Economic at $750 each	1,500

CRUSHERS

1—No. 12 Gates Style K manganese fitted nickel steel shaft (almost new)	8,000
1—No. 7½ Austin Gyratory	2,500
2—20x24 Blake, each	2,000
1—No. 4 Gates Gyratory	1,000
1—10x20 Blake	750

COMPRESSORS

1—Rand Imperial Duplex, cap. 1,500 ft.	2,000
1—Ingersoll, 2-stage, air, belt drive, 600 ft.	1,000

DIPPER

1—2½-yd. Bucyrus	500
1—¾-yd. Browning with boom and engine (new)	750

DRILLS

8—Chicago Pneumatic Tool Co. 3¼ in. drills, each	100

DERRICKS

1—5-ton Stiff Leg with steel bull wheel	500
1—2-ton Stiff Leg	200

ENGINES

1—150 H.P. Atlas Automatic	$ 750
1—200 H.P. Allis-Chalmers Corliss.	1,250
1— 20 H.P. Erie Center Crank	200
1— 70 H.P. Erie Center Crank	300
1— 15 H.P. Keystone Reversible	250
1—Westinghouse	250
1—150 H.P. Stillwell Bierce	150

HOISTING ENGINES

2—6¼x10 American Hoist and Derrick with boiler at $750 each	1,500
2—6x8 Contractors' Plant Co. S. C. S. D., at $200 each	400
1—8x12 Lidgerwood D. C. D. D.	500
1—12x14 Special Dragline, 90 H.P. (new)	1,500
1—9x10 D. C., 3-drum Cableway Engine	1,500

LOCOMOTIVES

1—Vulcan 36-in. gauge Saddle Tank	1,000
1—Porter Standard Gauge Saddle Tank, 14 tons	2,000

PUMPS

1—No. 5 Pulsometer	100
1—Wilson-Snyder Water Works, 3,000,000 gals. per day	1,500

ROLLERS

1—10-ton Steam Roller	1,000

SCREENS

1—42-in. by 14-ft. Screen complete	400
2—Stephens & Adamson at $150 each	300

SHOVELS

1—Model 28 Marion Traction, fine.	4,700
1—Vulcan-Bucyrus Revolving Shovel, standard gauge, perfect	3,250
1—70 C. Bucyrus with standard, also stripping booms and dippers	11,000

We Own All of the Above and Guarantee

Every Item to Be Exactly as Represented

Write, Wire or Telephone at Our Expense

Machinery Sales Company

Successors to

GEORGE C. MARSH & CO.

Contractors' & Railway Equipment

Telephone Harrison 6904

General Offices

744 Old Colony Building, CHICAGO

CRUSHING PLANTS
STEAM SHOVELS
LOCOMOTIVE CRANES
LOCOMOTIVES
QUARRY CARS
ELEVATORS
SCREENS
STEEL DUMP CARS
CLAM SHELL BUCKETS

HOISTING ENGINES
AIR COMPRESSORS
TRENCH MACHINES
DRAG LINE EXCAVATORS
STEAM ROLLERS
CABLEWAYS
CONCRETE MIXERS
BOILERS
ENGINES

FOR SALE OR RENT
CONTRACTORS EQUIPMENT

AIR COMPRESSORS

7—Chicago Pneumatic Tool Co. Class N—SGLTM 10½x7¼x10 in., with gas engine and air receiver mounted on trucks. Practically new.

DERRICKS

1—Stiff Leg, boom 16-in. x 16-in. x 80-ft., mast 16-in. x 16-in. x 50-ft., bucket operating, like new.
5—Stiff Leg Derricks, boom 14-in. x 14-in. x 60-ft., mast 12-in. x 12-in. x 32-ft., sills and legs in proportion, Terry & Tench fittings, 2 arranged for clam shell, 3 for single line.
1—Stiff Leg, 40-ft. boom, capacity 3 or 4 tons.
2—Breast Derricks.

HOISTS

1—10x12 D. C., D. D. Lidgerwood, with banked levers, no boiler.
3—9½x12 D. C. 3 drum with boiler, 2 Lamberts and one National with attached swinger.
10—8¼x10 D. C., D. D. with boiler, American, Lambers, Lidgerwoods, Flory, Clyde or Mundy.
15—7x10 D. C., D. D. with boiler, American, Lidgerwood, Lambert, O. & S., Mundy, Clyde and Flory.

STEAM SHOVELS

2—Type O Thew, fully revolving, ⅝ yd. dipper, traction wheels.

EXCAVATORS AND BACKFILLERS

3—Keystone Excavators, steam engine, boilers, complete with skimmer scoops.
1—Buckeye Wheel Type Trenching Machine, No. 4, with gasoline engine, on caterpillar traction.

BUCKETS

1—Brand new 2½-yd. Butler dragline bucket.
1—1-yd. Hayward orange peel.
Several others of various makes and sizes.

WAGON LOADERS

5—Jeffrey Portable gasoline driven traction bucket wagon loader, like new.

CARS

15—34-in. gauge Koppel V-shaped, 1-yd. side dump cars.
35—36-in. gauge, 4-yd. Western side dump cars.
12—12-yd. standard gauge, side dump.

DRAG LINE

1—Insley Drag Line, new, 60 ft. boom, with 1½ yd. drag bucket; with 9x13 National engine, with boiler, like new.

These are only a few items of the equipment we own. If you do not find what you want, write or wire us your requirements.

We are in the market for used equipment of all kinds. Write us, giving full description and price.

Equipment Corporation of America

Land Title Building, Philadelphia, Pa. — **Lumber Exchange Building, Chicago, Illinois** — **Empire Building, Pittsburgh, Pa.**

Something New in Hoists and Buckets

HOWARDS new, all-steel gears, two-speed Hoist, specially designed to operate Gravel Buckets with electric or steam power. Howard Gravel Bucket is in use by many leading firms.

8¼x10 D.C.D.D. Hoist with one-yard Gravel Bucket for sale.

Write us what you want in contractors' machinery.

M. E. Howard Engine & Boiler Works

Indianapolis, Ind.

FOR SALE—TRUCKS

2—Knox Tractors, Model No. 35. 40 H.P. 4 cyl. motors—8 cy. end dump.
2—Knox, Tractors, No. 35. 40 H.P. 4 cyl. 12 cy. side dump.
2—Knox Tractors, Model No. 36. 40 H.P. 4 cyl. 3 cy. side dump.
4—10 cy. gravity side dump 4-wheel Lee Trailers.

Dunbar & Sullivan Dredging Company

2212 Dime Bank Building
Detroit, Mich.

FOR SALE

Motors, Generator Sets, Air Compressors and Electrical Equipment of every description for immediate shipment. Send us your requirements.

Electrical Equipment & Machinery Co., Inc.

714-716 West Van Burren Street
CHICAGO

Long Distance Telephone, Haymarket 5588

FOR SALE

Monighan Dragline, 7x10, D.D.D.C., 1-yd. Page bucket	$3,250
Thew O Shovel	4,700
3 Pavers, $1,200, $1,700, $2,600.	
Koehring Alley Paver, ¼-yd., 8-ft. chute	800
Clyde Hoisting Engine, 8¼x10, 50 H.P.	1,350
Steam Force Pump, 3,000 gals. per hour	120
Marion Shovel, 55-ton, 2½-yd.	5,500
1,000 feet 2½ pipe. Ton	90
½-yd. Concrete Mixer, gas	400
Dredge D. C. Engine, 8½x10, 1-yd. orange peel	1,200

SEYMOUR ENG. CO.,
140 So. Dearborn, Chicago

WANTED

Dinkey locomotives, 7, 9, 12, and 14 ton in the Davenport and Vulcan make. Will accept them in any condition that will justify our rebuilding and repairing same. Quote us your lowest cash price.

THE PITTSBURG BOILER & MACHINE COMPANY
Pittsburg, Kansas

FOR SALE

Stiff Leg and Guy Derricks
Two and Four-Drum Hoisting Engines
Air Compressors, Air and Steam Drills
24" and 36" Dinkey Locomotives
24" and 36" gauge Koppel Cars
24" and 36" gauge Western Dump Cars
Steam Shovels and Drag Lines

ELLIS WOOLMAN
117 27th Ave., S. E.
Minneapolis, Minn.

FOR SALE

One Lima Locomotive standard gauge, purchased new in 1917, Shop No. 1120. Can be seen working.

One Erie Shovel, Shop No. 404 with extra 30-ft. boom and ¾-yd. Williams bucket. Can be seen working.

One 12-in. Erie Sand and Gravel Pump, elbows, nipple and drive pulley. Pump used less than week, shows no wear.

NICKEL PLATE GRAVEL COMPANY
313 Commerce Bldg., Erie, Pa.

FOR SALE

Two Berg Dry Presses in excellent working condition. Capacity, 18,000 to 22,000, 9-inch brick, 10-hour day. These are offered at a bargain. Write us for further particulars.

A. P. GREEN FIRE BRICK CO.
Mexico, Missouri

FOR SALE

Thirty-five acres of Sand & Gravel Land, alongside two Railroads.

R. N. COOPER
Gibson City, Ill.

FOR SALE

Revolving Thew Shovel, 1¼-yard dipper, on railroad wheels, bought for government contract. Only used four months. Excellent condition, ready for immediate shipment.

NEWSOM CRUSHED STONE & QUARRY CO.
R. F. D. No. 2. Antioch, Tenn.

FOR SALE

10-inch Belt-Driven Sand Pump. New Manganese Steel Runner. Installing bigger pump.

Broadway Sand, Gravel & Art Stone Co.
Stop 5, Bedford, Ohio

LOCOMOTIVE CRANE

1—Locomotive Crane, Browning, 10-ton, 36 ft. boom, double drums for bucket. 4 wheel, standard gauge, excellent condition.

MOORE BROS.
39 S. La Salle St., Chicago, Ill.

FOR SALE

One revolving screen made by Webster Mfg. Co. Length between bearings, 17 ft. Gravel screens 4 ft. in diameter, sand screen 6 ft. in diameter. Good condition.

THE BEDFORD-NUGENT CO.
Evansville, Ind.

WANTED

Dredge man, thoroughly familiar with centrifugal pumps, at Sand and Gravel Plant located in the East. Good wages to right party.

Address Box 50, Pit and Quarry, 538 So. Clark Street, Chicago, Ill.

MACHINERY—For Sale—DERRICKS

Road Roller—8-ton Wheeling tandem, A-1 shape; price $1,800.00.
Road Rollers—5 and 10-ton.
We have on hand 5 Road Paving Concrete Mixers, Koehring-Foote-Municipal

10 Barnes Force Pumps with Novo Gasoline Engines, 225-lb. pressure. Pumps 1,500 gallons per hour through 20,000 feet of 2-inch pipe, 3"x5" and 4"x5".

STEAM BOILERS

50 H.P. vertical boiler.
125 H.P. firebox boiler, Butt Strap.
7x10 Lidgerwood D. C. swinging or car pulling hoisting engine.
7x10 double drum double cylinder hoisting engine.
6¼x8 double drum, double cylinder hoisting engine.
8¼x10 three drum, double cylinder hoisting engine.
Clam Shell Buckets, ½, ¾ and 1 yard.
Channon Drag scraper Bucket.

Hayward Orange Peel Bucket 1½ yard.
Vulcan Pile Hammers, Steam and Drop.
Steam Rock Drills, Sullivan-Ingersoll.
Air Compressors, all sizes.
Pulsometer and Nye Steam Pumps.
Centrifugal Water Pumps.
Pulleys and Shafting, all sizes.
Friction Hoisting Drums.
Wire Rope Sheaves, Blocks and Bronze Bushings for Sheaves.

Big lot of wide elevator and conveyor belting.
Lot of 15-in. steel elevator buckets.
All kinds of pipe and steel rails.

The above is just a partial list of what we have. We are offering for sale over $500,000 worth of all kinds of good used machinery of every kind such as you need, and we can save you a lot of money on your requirements. We also manufacture a full line of steel and wooden derricks, portable derricks, portable clam shell bucket cranes, cableways, drag scraper outfits, screens, elevators, hoisting engines, gasoline engines, pumps, steam boilers, smoke stacks, Koppel cars, steel rails, crushers, Barge Derricks.

Write to us. We know what we are doing, can save you money and give you the quickest shipment of any manufacturer.

Wilson Machinery Company

Telephone Yards 352 301-331 West 35th Street, Chicago

FOR IMMEDIATE DELIVERY

A. C. and D. C. MOTORS & GENERATORS—New and Used

2—75-HP 500-v DC Westinghouse motors
2—80-HP 500-v DC Allis-Chalmers motors
3—50-HP 500-v DC Westinghouse motors
1—30-HP 500-v DC Westinghouse motor

We Are Direct Agents for GENERAL ELECTRIC NEW MOTORS AND GENERATORS of All Descriptions

ALL MACHINERY SOLD BY US IS GUARANTEED

Send us a list of your needs and we will convince you.

CHICAGO ELECTRIC CONSTRUCTION CO.

740 W. VAN BUREN ST. CHICAGO, U. S. A.

STONE CRUSHERS

Need one? Then get in touch with us before otherwise supplying your requirements. We are headquarters for good "used" machinery of this character and have many bargains in:

Gyratory Type: Size No. 2 to No. 21, nearly all makes.
Jaw Type: Size 7½x13" to 60x84".
Crushing Rolls: Have several sets, large and small.
Symons Disc: Sizes 18", 24", 36" and 48".
Pulverizers: Have quite a few, including a Sturtevant No. 2 Duplex Ring Roll Mill, a Williams No. 10 Deck Sweeper, a Jeffrey A-7 Heavy Duty, a Jeffrey No. 2, a Gardner No. 1, Etc.

We can serve you equally as well in Locomotive Cranes, Locomotives, Cars, Hoisting Engines, Air Compressors, Etc.

WM. B. GRIMSHAW CO.

1055 Drexel Bldg.
Philadelphia, Pa.

Dealers in USED But NOT ABUSED Machinery

BLOCKS

2—30 ton, 18 in. new three sheave special heavy Boston & Lockport wire rope blocks with shackles.

BUCKETS AND SKIPS

1—1¼ yd. Hayward Class E Clam Shell (ore bowl).
1—1¼ yd. Hayward Multipower Orange Peel.
10—2½ yd. Excelsior Bottom Dump.
12—3½ yd. Steubner Controllable Bottom Dump.
20—4 yd. (4 chain) extra heavy steel skips.

CHANNELING MACHINES

2—Ingersoll-Rand H8, one with and one without boiler.
1—Sullivan Y-8 with boiler.

COMPRESSORS

1—950 ft. Ingersoll-Sargent straight line simple steam, two stage air.
1—1300 cu. ft Ingersoll-Sargent belted with 200 H.P. 3 ph. 60 cycle, 2200 volt motor.
1—2400 cu. ft Ingersoll-Rand two stage air cross compound with Corliss valves.

CRUSHERS

1—No. 5 P. & M. Gyratory.
1—No. 7½ Style "K" Gates Gyratory.
1—No. 21 Style "K" Gates Gyratory.
1—60x84 P. & M. Superior Jaw.

DERRICKS

1—15 ton 100 ft. boom American Steel Guy.
1—3 ton American self slewing Steel Guy Crane Derrick with 60 ft. horizontal boom and engine on mast.

DRAGLINE OUTFIT

1—70 ft. boom heavy A-frame outfit with bull wheel, on rollers for handling 1½ yd. Page Bucket, with 10x12, 3-drum American Engine with extra large boiler and 7x8 separate American Swinging Engine.

HOISTS

1—6¼x8, d. c. d. d. Lidgerwood with boiler.
1—8¼x10, d. c. d. d. & Swinger Lidgerwood. with boiler.
1—9x10, d. c. d. d. & Swinger Lidgerwood.
1—10½x12 d. c. d. d. & Swinger Lambert.
1—60 H.P. d. d. & Swinger Lambert Electric.

LOCOMOTIVES

STANDARD GAGE

1—12x18, 4 wh. American Saddle Tank.
3—13x18, 4 wh. American Saddle Tank.
1—14x22, 4 wh. Baldwin Saddle Tank.

MOTOR

1—400 H.P. Squirrel Cage G. E. Motor for 3 ph. 60 cy. 2200 volts current.

SAND ROLLS

2—40 in. x 15 in. Allis-Chalmers "Anaconda" type.
3—54 in. x 24 in. Allis-Chalmers "Anaconda" type.

STEAM SHOVELS

1—No. 69 Osgood 2½ yd. dipper.
1—No. 70C Bucyrus 2 yd. dipper.
1—No. 95C Bucyrus 3½ yd. dipper.
1—No. 100C Bucyrus 3½ yd. dipper.
Also Drills, Screens, Pumps, Locomotive Cranes and Road Cranes.

T. H. LETSON CO.

Hudson Terminal Bldg.,
NEW YORK, N. Y.

OIL ENGINES

Slightly Used—Prompt Delivery

60 H.P. Fairbanks Morse
50 H.P. Metz & Weiss
50 H.P. Fairbanks Morse
40 H.P. Fairbanks Morse
25 H.P. Fairbanks Morse
20 H.P. Fairbanks Morse

50 various sizes of other makes.

A. H. McDONALD

548 W. Monroe St. Chicago, Ill.

Standard Gauge Locomotives

2—19-ton, four-driver saddle-tank Porters.
1—40-ton, 17x24 in. four-wheel switcher.
2—50-ton, 18x24 in. six-wheel switchers.
1—14-ton, 9x14 in. 36 in. gauge Vulcan.

MISCELLANEOUS

1—Western standard gauge spreader.
1—Model 76 Marion steam shovel, No. 3503.
1—Model 28 Marion, traction.
1—Class 14 Bucyrus drag-line, 60-ft. boom, 2-yd. bucket, Shop No. 733.
2—1-yd. Foote side discharge concrete mixers.
40—60,000-lb. capacity flat cars.
50-lb. and 56-lb. rail ties, 1½-yd. clam-shell bucket, 10 H. P. and 45 H. P. upright boilers, railway equipment, etc.

INDUSTRIAL EQUIPMENT CO.
McCormick Bldg.
Chicago, Ill.

FOR SALE

1—No. 7½ Austin Crusher, almost new.
1—Class "G" Duplex Air Compressor, capacity 925 F. P. M.
1—Class "H" Duplex Air Compressor, capacity 342 cu. ft. per minute.
1—14x20 Atlas Plain Side Crank Steam Engine.
1—14x20 Russel Side Crank Steam Engine.
1—11x16 Side Crank Steam Engine.
1—Model "G" Marion Steam Shovel, good condition, low price.
1—17x24, 4-4-0 American Passenger Locomotive.
1—10x16, 36-in. gauge Vulcan Saddle Tank Locomotive. (Boiler needs overhauling.)
2—13-ton Standard Gauge Whitcomb Gasoline Locomotives.
1—10-ton Superior Stone Grapple.
1—40 in. x 13 ft. Revolving Screen.
1—Well Drill.

313 Clinton Bldg., Columbus, Ohio

FOR SALE OR RENT

Full revolving steam traction shovel, ⅞.
Bucyrus ½-yd. steam traction.
Sturtevant (Pulverizer).
10-ton, 3-wheel roller.
Stiff leg derrick with 1-yd. clam.
35-ton rod locomotive.

I own above and can ship promptly.

D. B. STRALEY, Crown Point, Ind.

MACHINERY AND EQUIPMENT FOR SALE

BUCKETS

2—1-yd. Concrete at $50 each.
3—2-yd. Brown hoist.

BOILERS

1—200 H. P. Scotch Marine.
1—30 H. P. Upright. 1—60 H. P. Upright.
1—15 H. P. Upright. 1—50 H. P. Upright.
2—72x18 Butt Strap. 125 lbs. pressure.

CRUSHERS

1—No. 10 Gates Style K Manganese fitted, nickel steel shaft (almost new).
1—No. 7½ Austin Gyratory.
2—24x24 Blake. 1—10x20 Blake.
1—No. 4 Gates Gyratory. 2—No. 5 Gates.
1—30x60 Blake Jaw Crusher, new.
1—36x60 Traylor, Type C, new.

COMPRESSORS

1—Ingersoll Straight Line, steam driven, cap. 807 ft.
1—Rand Straight line steam driven, cap. 450 ft.
1—Franklin Belt Driven, 2-stage, cap. 1200 ft.

DIPPER

1—¾-yd. Browning with boom and engine (new).

DRILLS

8—Chicago Pneumatic Tool Co. 3¼-in. drills.

DERRICKS

1—5-ton Stiff Leg with steel bull wheel.
1—All steel Guy derrick, 70-ft. mast, 58-ft. boom, 12-ft. bull wheel.
1—10-ton steel Guy derrick, 119-ft. mast, 115-ft. boom, 16-ft. bull wheel.
1—50-ton all steel derrick car, 60-ft. car, 55-ft. boom.

ENGINES

1—200 H. P. Allis-Chalmers Corliss.
1—20 H. P. Erie Center Crank.
1—70 H. P. Erie Center Crank.

HOISTING ENGINES

2—7x10 American Hoist and Derrick with boiler.
1—12x14 Special Dragline, 90 H. P. (new).
1—8½x13, 3-drum Mundy with boiler.
1—8½x10, 2-drum Lambert with boiler.

LOCOMOTIVES

1—Vulcan, 36-in. gauge, Saddle Tank.
1—10x16, 36-in. gauge, Davenport Saddle Tank.
2—9x14, 36-in. gauge, Davenport Saddle Tank.
1—11x16 Rhode Island—Standard gauge saddle tank.
1—40 Climax geared standard gauge.
1—Railway Car Co., gasoline locomotive, standard gauge.
1—16x24 Baldwin Saddle Tank.
1—16x24 American Saddle Tank.

ROLLERS

1—10-ton Steam Roller, Iroquois.
1—7-ton Steam Roller, Kelly-Springfield.
1—10-ton Case Roller (new).

SCREENS

2—Stephens & Adamson.
1—48x16 Gates Stone Screen.

SHOVELS

1—No. 261 Marion 6-yd., R. R. type.
2—70 Bucyrus 2½-yd., R. R. type.
1—95 Bucyrus 3½-yd., R. R. type.
2—Vulcan full revolving, ⅝-yd., R. R. type.
2—Thew O, late model.
1—Model 28 Marion Traction, fine.
1—70 C. Bucyrus with standard, also stripping booms and dippers.
1—60 Marion, 2½-yd.

MISCELLANEOUS

1—1500 cubic feet Pneumatic Tool Co. Compressor, D. C. to motor, 200 H. P.

Railway Motor Car Co. of America 110 S. Dearborn St., Chicago

RELIABLE EQUIPMENT

CRUSHERS

1—9x16 Reliance, new jaws.
2—9x16 Climax, mounted.
2—13x24 Farrell, nearly new.
1—No. 2 McCully gyratory.
3—No. 4 McCully gyratory.
1—No. 7½ Kennedy, manganese fitted.
Several complete crushing plants.

COMPRESSORS

1—McKiernan, steam driven, 1000 cu. ft.
1—Chicago-Pneumatic portable, gasoline driven, 6x8 in., 75-100 cu. ft.
1—Ingersoll Rand, 10x10x10, on wheels, 200 cu ft.

STEAM SHOVELS

1—A-1 Thew Traction, ⅞-yd. dipper.
1—No. 80 Marion 4-yd. dipper.

OTHER EQUIPMENT

1—Parsons E-48 Trench excavator.
1—Dull dragline excavator, 1½ yd.
2—3-ton Bell locomotives, 24-in. gauge.
1—No. 5 Leyner drill sharpener.
1—12-in. Dredging Pump, 10x12 in. engines.
Also hoists, derricks, buckets, and contractors' plant, overhauled at our shops.

BOSTON OFFICE: Old South Building, Main 4233

Hubbard-Floyd Company, Inc.
MAIN OFFICE—NEW YORK
1112 Grand Central Palace
Vanderbilt 1465

PHILADELPHIA OFFICE: Land Title Building, Spruce 4745

FOR SALE

CRUSHERS

1—No. 21 Gates Gyratory
2—No. 12 Gates Gyratory
1—No. 10 Gates Gyratory
1—No. 10 Kennedy Gyratory
1—No. 9 Gates Gyratory
3—No. 8 Gates Gyratory
4—No. 7½ Assorted Gyratory
6—No. 6 Assorted Gyratory
3—No. 5 Assorted Gyratory
8—No. 4, 3 and 2 Assorted

PULVERIZERS

12—Hammer Pulverizers
15—Sets Crushing Rolls
35—Griffin Mills
8—Ball & Tube Mills
2—Symons Disc Crushers
15—Kent Mills
3—Pebble Mills
3—Sturtevant Mills
4—Burr Mills 3—Raymond Mills

GRINDERS

1—60x84 Jaw Crusher
10—10x20 to 36x48 in.
6—Portable Jaw Plants
4—Coal Crushers
3—Tipples
6—Ore Washers
8—Channeling Machines
Conveyors—Screens
Stripping and Loading Shovels, Cars and Cranes

Locomotives, Cars, Rails, Steam Shovels, Dragline Machines, Dredges, Corliss Engines, Water Tube and Return Tubular Boilers, Turbo Generators, Direct Connected and Belted, also Fuel Oil Direct Connected Sets, Heavy Fuel Oil Engines, Electric Fuel Oil Locomotives, Compressors, Drills, Cutting and Channeling Machines, Stone Derricks, Electric and Steam Hoists.

J. F. DONAHOO CO. **Birmingham, Ala.**

STEAM SHOVELS

1 Model 18 Osgood Steam Shovel, on traction wheels, shop No. 378, ready for immediate shipment.
1 No. 0 Thew, shop No. 1194, combination boom, mounted on traction wheels, ¾-yd. dipper.
1 No. A-O Thew, shop No. 1259, mounted on traction wheels, ⅝-yd. dipper.

PAVING MIXERS

1 3-bag Koehring Paver, with delivery boom and bucket, steam engine and boiler.
1 3-bag Milwaukee Paver, with delivery boom and bucket, steam engine and boiler.
1 2-bag Chain Belt Paver, with delivery boom and bucket, steam engine and boiler.
1 1-bag Ransome Paver, gasoline, with delivery chute.
1 2-bag Koehring Paver, with steam engine and boiler, and delivery chute.

ROAD ROLLERS

1 10-ton Iroquois, double cylinder, 3-wheel, steam roller.
1 10-ton Monarch, double cylinder, 3-wheel steam roller.
1 10-ton Kelly Springfield, double cylinder, 3-wheel steam roller.
1 10-ton Good Roads, double cylinder steam tandem roller.
1 6-ton Kelly Springfield, steam tandem roller.
1 6-ton Erie, steam tandem roller.
1 10-ton J. I. Case, 3-wheel steam roller.
1 10-ton Austin, 3-wheel, gasoline roller.
1 10-ton Kelly Springfield, 3-wheel gasoline roller.

DRAG LINES

1 Monighan T Walker, shop No. 253, equipped with 3-cylinder Vertical Westman type engine and 1-yd. bucket, ready for immediate shipment.

INDUSTRIAL RAILWAY

2 13-ton Lima Shay Locomotives, 24-in. gauge, geared locomotives.
50 1½-yd., V-shape, 24-in. gauge Koppel cars.
25 1½-yd., Western two-way dump cars, 24-in. gauge.
20 tons of 20-lb. rails.
2 miles Koppel track, 20-lb. rails, in 15-ft. sections, 7 ties to the section.

MIDWESTERN CO.
Telephone Majestic 8356
140 S. Dearborn St., Chicago

SAND PUMPS

Two 10" Morris Steel-Case Centrifugal Sand Pumps, fine condition; immediate shipment.

1,000 other machinery bargains actually owned and on hand for immediate shipment.

Wickes Machinery Co.
Jersey City, N. J.

EQUIPMENT FOR IMMEDIATE DELIVERY

1—Vulcan 1¼-yd. traction shovel, Little Giant type — especially adapted for quarry work.
1—Osgood "18" revolving traction shovel, ¾-yd. dipper, long boom, special cable hoist.
4—18-ton 36-in. gauge saddle tank locomotives, fine condition. Cylinders, 10 in. x 16 in.
9—36-in. gauge Koppel flat cars.
50—Western 4-yd., 36-in. gauge dump cars, steel lined, fine condition.
2—No. 5 Austin gyratory elevator crushers with fittings and buckets.
Also have hoisting engines, compressors, rails, etc. WIRE OR WRITE FOR QUOTATIONS.

THOS J. DOLAN,
76 W Monroe St., Chicago, Ill.

Locomotive Crane

1—10-ton Industrial, 8-wheel MCB crane with 45 ft. boom and yard bucket.

Steel underframe and 24 ft. steel car. Just through the shop and ready for instant delivery.

Machinery Warehouse Co., Inc.,

1455 W. 38th St., Chicago, Ill.

FOR SALE

1-10 in. Manganese Steel Dredge Pump, with extra propeller, belted, suction pipe and strainer.

1½ yd. Negley Slack Line Bucket and Carriage.

550 ft. 1⅜ in. Hercules Cable.

1—No 1 3-M Universal Jaw Crusher.

Above all in good condition.

The Carmichael Gravel Co.
WILLIAMSPORT, INDIANA.
Rialto Bldg., St. Louis.

WANTED

One Dake, single drum, double geared hoist.

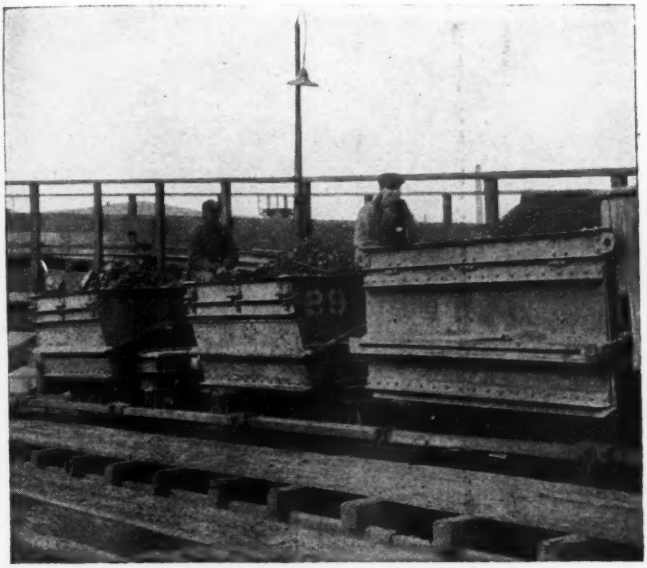
CHARLES STONE CO.
Marion, Ill.

FOR SALE

Quarry Leasehold in Philadelphia. Quarry fully equipped with plant and Railroad siding for large contracts.

HOLMESBURG GRANITE CO.,
809 Commercial Trust Bldg., Philadelphia, Pa.

EASTON CARS "on the job"



EASTON INDUSTRIAL CARS

Complete Equipment

We are more than just car builders—we are also designers and builders of complete industrial Railway Equipments.

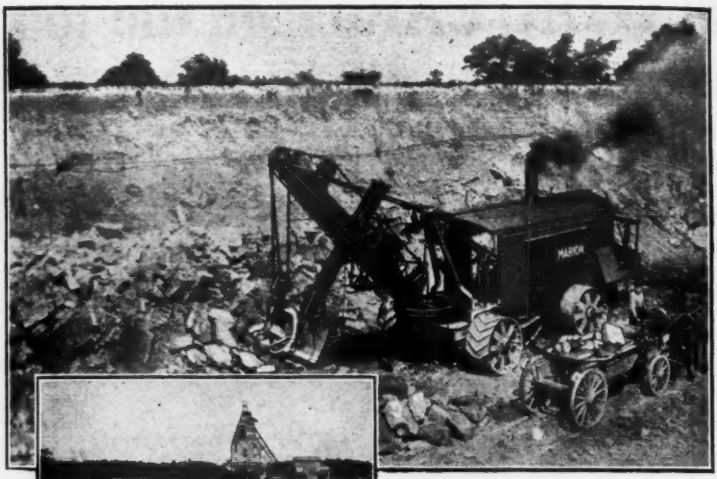
Our twenty-five years' experience and the skill of our engineers in charge of designing and manufacturing guarantees the successful and economical operation of all Easton Equipments.

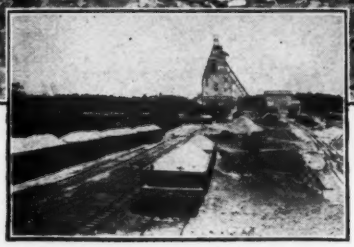
Whether your present requirements demand merely a single car, Turntable or Switch, or a complete Industrial Railway Installation, you will find us ready to serve you **promptly.**

Tell us your present needs and we shall be glad to have our nearest representative consult with you. Catalog?

EASTON CAR & CONS'T'N CO.

EASTON, PA.





This stone, loaded by "Marion" Shovels, will soon be used on Marion-built roads and streets, and for concrete buildings with Marion-dug basements. "Marion" Shovels see the job through.

Bigger production—fewer men

That's the combination facing you stone producers—big firms and small alike. Slower, costlier methods of handling and loading "got by" under a normal labor market; now you must "cut corners" wherever you can—and a "Marion" is the place to begin.

Some of our first machines—built nearly 35 years ago—went into quarries. They are still there, ably backed up by hundreds of later "Marions" sold as repeat orders.

The new "Marion" policy—building a larger quantity of a few models and discontinuing certain types altogether for the present—gives us a greatly-increased output of Shovels suitable for service in both large and small quarries. Write us the particulars of the work you have to do—we'll send estimate and full information including delivery date, on a suitable "Marion" to do the work.

The Marion Steam Shovel Company

Established 1884 **Marion, Ohio**

New York *Chicago* *Atlanta* *San Francisco*

Marion

USED MOTORS

For Immediate Delivery—Overhauled and Guaranteed—Largest Stock in America to Choose From. For Sale: 3 Phase, 60 Cycle, 220 V.

	H.P.	Speed
1—	3—General Electric	1800
1—	3—Westinghouse	1200
1—	5—Wagner	1800
1—	5—Allis-Chalmers	1200
1—	7½—General Electric	1800
1—	10—Westinghouse	900
2—	15— " Type CCL.	1750
2—	15—Watson, slip-ring, var. speed	1720
1—	15—Fairbanks-Morse	1200
1—	15—General Electric, Form L	1200
1—	15—General Electric	1200
3—	15—Fairbanks-Morse, slip-ring, constant speed	1200
1—	15—Westinghouse, vert.	1135
2—	15—Allis-Chalmers	1130
2—	15—Allis-Chalmers	860
2—	15—Westinghouse	850
4—	20—Westinghouse	1750
1—	20—General Electric	1200

Send for MONTHLY BARGAIN SHEET, showing complete stock and net prices.

GREGORY ELECTRIC CO. CHICAGO, ILLINOIS

LOCOMOTIVE CRANES

35-ton McMyler.
15-ton, 8-wheel Browning.
10-ton Brown Hoist.
10-ton Industrial.

LOCOMOTIVES (36" Gauge)

4—Porters, 9x14, Saddle Tank.
4—Porters, 11x16, Saddle Tank.
2—Vulcans, 10x16, Saddle Tank.
2—4-ton Bell Oil, 24-in. Gauge.

LOCOMOTIVES (Standard Gauge)

1—35-ton Saddle Tank.

BUCKETS

1—2-yard Brown Hoist Clamshell.

CARS

1—Passenger Car, Standard Gauge.
1—Box Car, Standard Gauge.

HOISTS

1—8¼x10 Kendall D.C. D.D. Boiler.

FLAT CARS

80—Standard Gauge, 50,000-lb. cap., with stake pockets.

DERRICKS

10 to 30 tons.

HOISTING MACHINERY CO.,
Hudson Terminal Building
New York

CRUSHING PLANTS

1—Crushing plant complete with No. 4 Austin gyratory crusher elevator and screen, 45 H.P. gasoline engine, hoist, dump cars, drills, tracks, turntable, scale, building and bins—all in fine condition. OHIO.

1—Crushing plant complete with No. 5 Austin gyratory and No. 4 Gates Crushers, 80 H.P. tubular boiler, 75 H.P. engine, water heater, pumps, bins, elevators, revolving screen, belting, etc. OKLAHOMA.

1—Crushing plant complete with No. 3 Symons gyratory crusher, 40 H.P. upright boiler, 40 H.P. Chandler and Taylor engine, belt hoist, 3 quarry cars, 30-ft. capacity, 250 ft. light track. All in fine working condition. INDIANA.

ALSO—Draglines, Steam Shovels, Crushers, Locomotives, Cars, Track, Relaying Rail, Derricks, Etc.

LEONARD F. SMITH & CO.
Citizens National Bank Building
SOUTH BEND, INDIANA

FOR SALE

STEAM-SHOVELS

1—No. 0 Thew Revolving Traction Shovel, Shop No. 876, ⅝-yd. dipper.
1—18-B Bucyrus Revolving Traction Shovel, Shop No. 1821, ⅞-yd. dipper.
1—65-ton Bucyrus R. R. Type Shovel, 2½-yd. dipper.

SLACKLINE

1—Complete Slackline, 1¼-yd. Shearer & Mayer Bucket, American Hoist, mast, guy, sheaves, track cable, haulage cable, etc.

CARS.

13—3-yd. Western side dump cars, 36-in. gauge.
9—4-yd. Western side dump cars, 36-in. gauge.
4—3-yd. steel end dump quarry cars, 36-in. gauge.
6—2½-yd. steel end dump quarry cars, 36-in. gauge.

CRUSHERS.

2—No. 5 Austin Crushers, Manganese fitted.

LOCOMOTIVES.

1—40-ton Pittsburgh six-wheel switching locomotive.
1—40-ton Brooks six-wheel switching locomotive.

HOISTING ENGINE.

1—7x10 Lidgerwood D.C.D.D. Skeleton Hoisting engine.

Will pay cash for good, used equipment of all kinds. Write us what you have for sale.

COOLEY BROS.,
456 Old Colony Bldg., Chicago

Electric Hoist Motors

2—75-HP. G. E., D. C., hoist motors, complete with resistance and drum controllers, 230 volts.

Centrifugal Pumps

1—Dayton centrifugal pump, 5" suction, and 4" discharge, complete with accessories.

1—Worthington centrifugal pump, 6" suction and 8" discharge, complete with accessories.

2—4" Morris Machine Works electric centrifugal sand pumps, with or without motors.

1—12" Morris Machine Works electric centrifugal sand pump with or without motor.

For quick sale, very cheap.

2000 Other Bargains in Motors

NATHAN KLEIN & CO.

Baxter, Centre and Howard Sts.

NEW YORK CITY

MOTOR TRUCKS

2 -ton Jeffrey Quad side dump body.

3½-ton Sterling dump truck.

3½-ton Indiana dump truck.

5 -ton Sterling dump truck.

2½-ton Sterling Chassis.

3 -ton Garford Chassis.

6 -ton Sauer Chassis.

We also have excellent bargains in cranes, steam shovels, concrete mixers and pavers, boilers and engines.

Bonsack Machinery Company

1601-4 Boatmen's Bank Bldg., ST. LOUIS, MO.

Immediate Delivery

Send us your inquiries

4—No. 6 Gates (Mang.) nickel steel shaft.
1—No. 8 Gates Reg. Drive.
1—No. 4 Crushing Plant, motor driven.
2—48-in. x 12 ft. Taylor (Mang.) Screens.
Locomotive Type Boilers—25-80-90 H. P.
25—Air Compressors (Steam, Belt), 50-4000 ft.
1—30-60 Emerson Brantingham Tractor.
1—18 ton Galion Loader & Bin.
2—36-in. & 1 48-in. Symons Disc. Crushers.
1—3D and 1 2D Gates Crushers.
1—5D Gates Crusher (Reg. Drive).
1—7½ Austin Crusher (Reg. Drive).
Gasoline Locomotives—Pavers—⅝-in. cable—Engines, etc. Contractors' equipment.
2,000 ft. New Transmission Rope.

ROSS POWER EQUIP. CO.

Indianapolis, Ind.

FOR SALE

Two large steel bins, hopper bottom. 450 ft. steel conveyor cashing for 16-in. screw conveyor, without lids.

One Special, 112 H. P., single-band, friction, electric hoist, complete. Almost new.

Address Box 21

PIT & QUARRY

538 S. Clark St. Chicago, Ill.

LEATHER RUBBER **BELTING** STITCHED CANVAS

An Enormous Stock of New and Used Power Transmission Machinery, Belting, etc.

TEUSCHER & SON MACHINERY SUPPLY CO.

527 N. Second St., St. Louis, Mo.
Send for No. 186 Bargain Book.

For 88 pages of unusually good bargains in

QUARRY EQUIPMENT

Hoists, Crushers, Wire Rope, Rock Drills, Boilers, etc.

Write for our Latest Big Bulletin.

ZELNICKER IN ST. LOUIS

OKEH ELECTRIC CO.
Not Inc.
General Electrical Contractors
Motors Bought, Sold and Repaired
Electrical Appliances and Equipment Devised, Installed and Repaired
Phone Monroe 5441
610 W. Randolph St. CHICAGO

WM. V. HOIER CO.
Power Piping
701 North Wells Street, Chicago
SUPERIOR 9868-6730

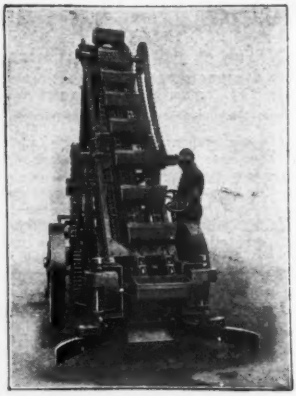
CRUSHER BARGAINS
2—No. 5 Austin Gyratory Crushers.
T. B. HUSBAND
3166 Redwood Avenue
Cleveland Heights, Ohio

FOR SALE
1—1¼ cu. yd. Dull Scraper Bucket.
2—400 ft. lengths 1¼-inch track cable in good condition.
1—600 ft. length ¾-inch hauling cable in good condition.
KEITH O. GUTHRIE
SCHENECTADY, NEW YORK

FOR SALE
New
⅞-YARD SEAVERNS CLAM SHELL BUCKET
Manufactured by
JAMES B. SEAVERNS
Engineer & Contractor
Peoples Gas Bldg., Chicago

FOR SALE OR RENT
Keystone Excavator.
65 ton Bucyrus shovel, 2½ yd.
Thew shovel, ⅝ yd.
24-in. gauge industrial outfit.
Cars, 24-in. V-shape dump and brick.
Steel forms, Blaw and Heltzel.
20 ton Shay locomotive.
Sturtevant Ring Roll Mill.
D. B. Straley, Crown Point, Ind.

IF YOU DON'T SEE
WHAT YOU
WANT
ADVERTISED
Write
PIT *and* QUARRY
Rand McNally Bldg.
CHICAGO



AUSTIN
Self-Feeding Wagon Loader

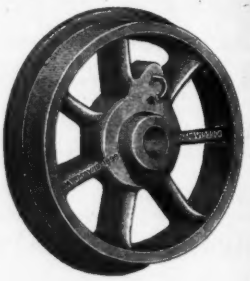
THE PATENTED SELF-FEEDING DEVICE SAVES MANPOWER

The outstanding feature of the Austin Wagon Loader is the Patented Self-Feeding Device. The steel feeding arms dig into the material, gather it up and pull it into the elevator buckets. Every bucket is thereby filled to the brim, and the two men necessary for this purpose on other loaders are eliminated.

The Austin Self-Feeding Wagon Loader has a capacity of 38 cu. ft. or 1.42 cu. yds. per minute. It greatly increases the running efficiency of wagons or trucks, and in some cases it has doubled the number of trips made when loaded by hand. An Austin Loader will speed up your deliveries and greatly reduce the cost of labor.

Write for Booklet W. L. 16 and full particulars concerning the Austin Loader or any of the Austin Machines in which you are interested.

F. C. Austin Machinery Co.
Railway Exchange Bldg., Chicago, Ill., U. S. A.



WHEELS

Cast Iron — Chilled — Annealed.
Plain or Self-Oiling Hubs.
Plate or Spoked Type.

Forty years' experience in this line

Hockensmith Wheel & Mine Car Co.
Penns Station, Pa.

Be Ready to Put Out that Fire!

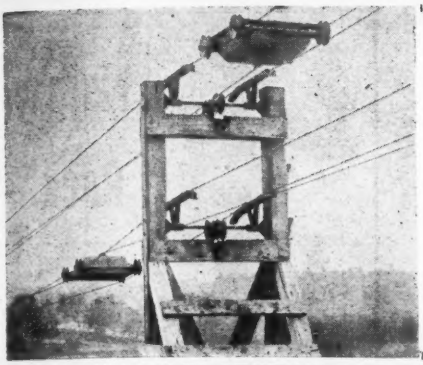
"FIRE GUN"

The new hand pump fire extinguisher for gasoline, oil, electric and all incipient fires.

A New Standard
Mechanically Right

Labeled by Underwriters.
25% more Fluid.
Discharges Contents ½ of the Time.
Can't Leak.
Shoots Constant Stream Farthest.
Complete with Fluid and Bracket.
Write for prices and information

Made By
Fire Gun Manufacturing Co.
Sales Office:
Frederick A. Watkins
565 W. Washington St., Chicago, Ill.



Solve Your Hauling Problem

Independent of slides, bad roads and rough country.

Lawson Automatic Tramway

Easy to Install and Operate
Low Upkeep and Labor Cost
Write today for our booklet

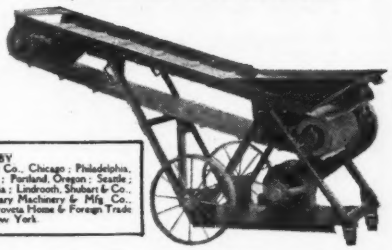
Interstate Equipment Corporation

Shops at Roanoke, Virginia

135 Broadway New York

A new model for loading Sand, Gravel, Lime, Salt, Phosphates and other materials. This Loader "works like a wheel-barrow." It is easily handled and earns its cost rapidly, without injuring fragile materials. We make 7 types of Box-Car Loaders. This one is "Type P." Write for particulars. "It's a 'great' little machine."

THE MANIERRE
BOX CAR LOADER



Address "Manierre"
Colby-Abbot Building
MILWAUKEE, WISCONSIN

REPRESENTED BY
The Link Belt Co., Chicago; Philadelphia, Pittsburgh, Pa.; Portland, Oregon; Seattle; British Columbia; Lindrooth, Shubart & Co., Denver; Calgary Machinery & Mfg. Co., Alberta; Yourovcta Home & Foreign Trade Co., Inc., New York

Rails!! New & Relayers Rails!!

Write or wire us when in the market to Buy or Sell.

HYMAN-MICHAELS COMPANY

P-533 Peoples Gas Bldg., Chicago

BRANCH OFFICES: First National Bank Bldg., Pittsburgh, Pa.; Railway Exchange Bldg., St. Louis, Mo.; East Chicago, Ind.; 35 Nassau St., New York.

YARDS AND WAREHOUSES: No. 1—East Chicago, Ind.; No. 2—Adelaide and Bulwer Ave., St. Louis, Mo.; No. 3—Broadway and Humbolt, St. Louis, Mo.

U. S. Crane Co.

Peoples Gas Bldg., Chicago

LOCOMOTIVE CRANES

Strongest—Most Accessible
for Proof: See Our Crane

Get Our Specifications

"Stronghold" Belt

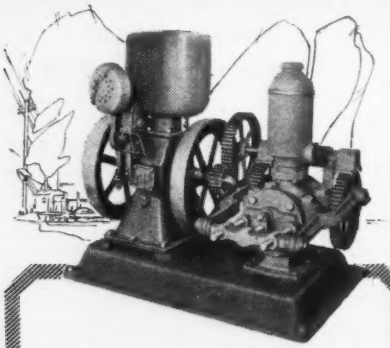
Specially constructed for Conveyors, Elevators and Drives.

Guaranteed to figure Economy

Manufactured by

Corns Conveyor Belt Co.

CHICAGO



This is the Ideal Force Pumping Outfit for long distance pumping. Furnished in 2½ to 10 H. P. sizes; capacities from 800 to 7,200 gallons per hour.

How Do You Figure Costs?

In estimating costs on labor saving equipment the first price is only a minor consideration.
The factor that counts—the item that means either profit or loss on your ledger—is *service rendered.*
Users who know Ideal Engines through actual experience never quibble about price. They can tell from the profit column in their ledger just how much Ideal Power has meant to them in increased dividends. They know that it takes exactly the kind of service that Ideal Engines deliver to make money for them.

Complete lines of Hoists, Pumps, Excavating Outfits, etc.

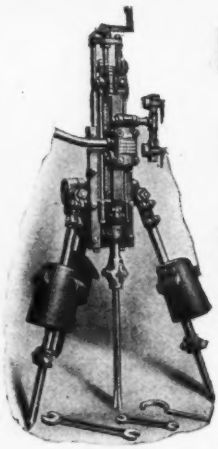
The complete line of Ideal Equipment includes practically every kind and type of labor-saving equipment that the contractor needs.
Hoists of various types and capacities, suction pumps, high pressure pumps, triplex pumps, air compressors, etc., are supplied as unit plants with Ideal Power.
Write and tell us your requirements and we will gladly send literature and quote prices.

Ideal Engine Company
R. E. Olds, Chairman
660 E. Kalamazoo St.
Lansing, Michigan

DISTRIBUTORS

Boston New York Philadelphia
Pittsburgh Cleveland Chicago
Minneapolis Kansas City Omaha
Atlanta

IDEAL POWER
IDEAL CONSTANT SERVICE POWER



Murphy Rock Drills

In Stock for prompt shipment.

Wickes Machinery Company
Jersey City, N. J.

WIRE CLOTH PERFORATED METAL SCREENS

FOR ALL PURPOSES

Western Metal Products Co.
731 N. Wells St. Chicago, Ill.

PERFORATED METALS and SCREENS OF ALL KINDS

MATERIAL IN STOCK
PROMPT SHIPMENT

Chicago Perforating Co
2445 West 24th Place
Tel. Canal 1489 CHICAGO, ILL.

LIME CALCINING AND HYDRATING PLANTS OUR SPECIALTY

BUILDERS OF THE "ARNOLD" LINING FOR VERTICAL LIME KILNS

ARNOLD & WEIGEL

Contractors and Engineers
Blausey Building
WOODVILLE, OHIO

Write for our booklet "The Arnold Lining for Lime Kilns"

INDUSTRIAL CARS
of all types
PORTABLE TRACKAGE
Rails, Switches, Etc.
Ask for Catalog No. 10
International Clay Machinery Co.
Dept. C DAYTON, OHIO

PIERCE J. McAULIFFE
17 Battery Place NEW YORK
Member American Society Mechanical Engineers
Member Society Naval Architects and Marine Engineers
DESIGN CONSTRUCTION OPERATION
SAND AND GRAVEL PLANTS—DREDGES
HYDRAULIC EXCAVATING EQUIPMENT
Hydraulic dredging equipment of my design now operating has annual capacity of over 25,000,000 cubic yards
Make use of the experience gained by 15 years' intensive study of problems of pumping solids before deciding upon the equipment for your new plant or the rehabilitation of your present plant

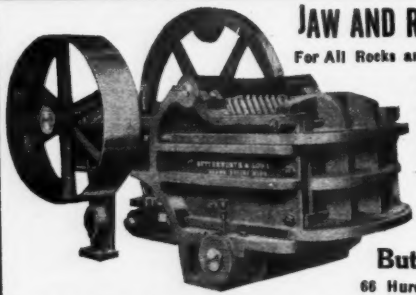
ROBERT W. HUNT, JNO. J. CONE, JAS. C. HALLSTED, D. W. McNAUGHER
ROBERT W. HUNT & CO.
INSPECTION—TESTS—CONSULTATION
INSPECTION OF NEW AND SECOND HAND CARS, LOCOMOTIVES, CRANES, DREDGES, STEAM SHOVELS, PUMPS, ENGINES AND ALL CLASSES OF QUARRY EQUIPMENT.
NEW YORK PITTSBURGH CHICAGO ST. LOUIS SAN FRANCISCO

TERRY

LOCOMOTIVE CRANES — TIMBER & STEEL DERRICKS

LET US SOLVE YOUR MATERIAL HANDLING PROBLEMS

TERRY



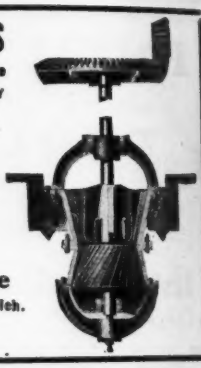
JAW AND ROTARY CRUSHERS

For All Rocks and Ores Softer Than Granite

GYPSUM MACHINERY

We design modern Plaster Mills and make all necessary Machinery, including Kettles, Nippers, Crackers, Buhrs, Screens, Elevators, Shafting, etc.

SPECIAL CRUSHER-GRINDERS FOR LIME



Butterworth & Lowe

66 Huron Ave., Grand Rapids, Mich.

Nippers—17x19", 16x28" 20x30", 24x36" and 26x42".

Rotaries—20" to 47" inside diameter. Many variations.

STOP PICKING; PICK THE "ADEN"

"ADEN"

HEAVY SERVICE

Grab Buckets

MANUFACTURED BY

The Advance Engineering Co.

Office and Works, 6539-41 Metta Ave.

Cleveland, Ohio

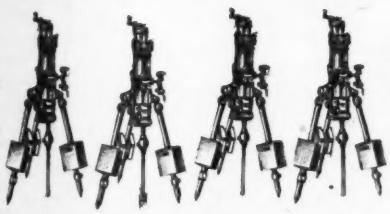
Union Steel Rivetless Chains

"The Chain of Double Life"
Fits Cut and Std. C. I. Sprockets
1 to 12 in. pitch.

High Carbon Links (STRENGTH) Large Glass—Hard, Reversible Bearings (DURABILITY), One-Piece Rivetless Construction (PERMANENCY) insure Trouble-Proof Money Saving Service. Bushing Chains, Roller Chains, Attachment Links, Buckets, Sprockets, Elevators, Conveyors, etc.

THE UNION CHAIN & MFG. CO. Seville, Ohio.

WOOD DRILL WORKS



Paterson, N. J.

ROCK DRILLS

and

Hammer Drills

all sizes and for
all purposes.

TOWER DRYER

FOR

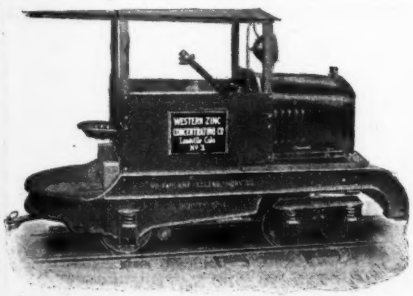
Sand, Gravel and Cement Plants

INSTALLATION, OPERATING and REPAIR COSTS
CUT IN HALF

"FARREL" STYLE "B" CRUSHERS

Complete Crushing, Screening and Washing Plants
for Sand and Gravel Bulletin C-2

EARLE C. BACON, Inc., Engineers 26 CORTLANDT ST., N.Y.



A Gasoline Locomotive
with a
Ford Engine Power Plant

adapted for very short curves
18 in. to 36 in. Gauge
300-lb.-600-lb. Draw-bar Pull

Practical : : Economical

Send for Catalog

The McFARLANE-EGGERS Mchy. Co.
2763 Blake St.
Denver, Colo.

DANIEL J. HAUER

Calvert Building Baltimore, Md.

Consulting Engineer--Construction Economist

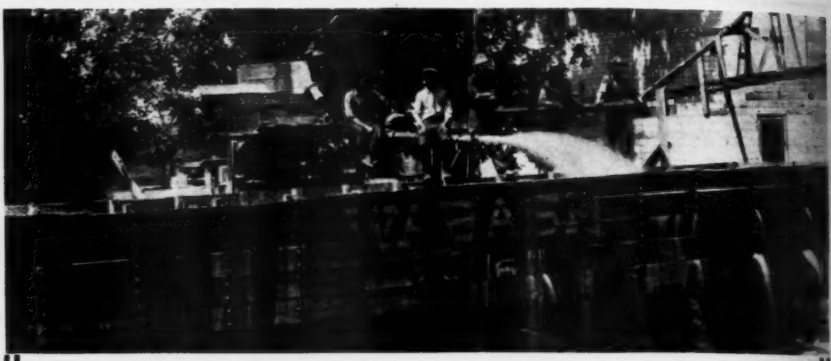
Associate Editor PIT AND QUARRY

Expert in Pit and Quarry Operations

Devises real cost keeping systems to suit YOUR Business

Better Methods and Modern Management

The same work for less money; more work for the same money



Loading Sand by Pumping

And they can do it,—a ton a minute!

with the

NYE STEAM SAND PUMP

We reproduce the above view through the courtesy of the United States Silica Co., of Chicago, who are among numerous satisfied users and indorsers of our pump. We shall be pleased to describe its various uses and adaptability to your requirements.

Nye Steam Pump & Machinery Company

710 N. Western Ave. Chicago, Ill.

Look for the Green Edge
and Gandy Trademark

GANDY BELT

Stitched Cotton Duck

GANDY BELTING COMPANY 750 West Pratt Street BALTIMORE, MD.

New York Office: 36 Warren Street

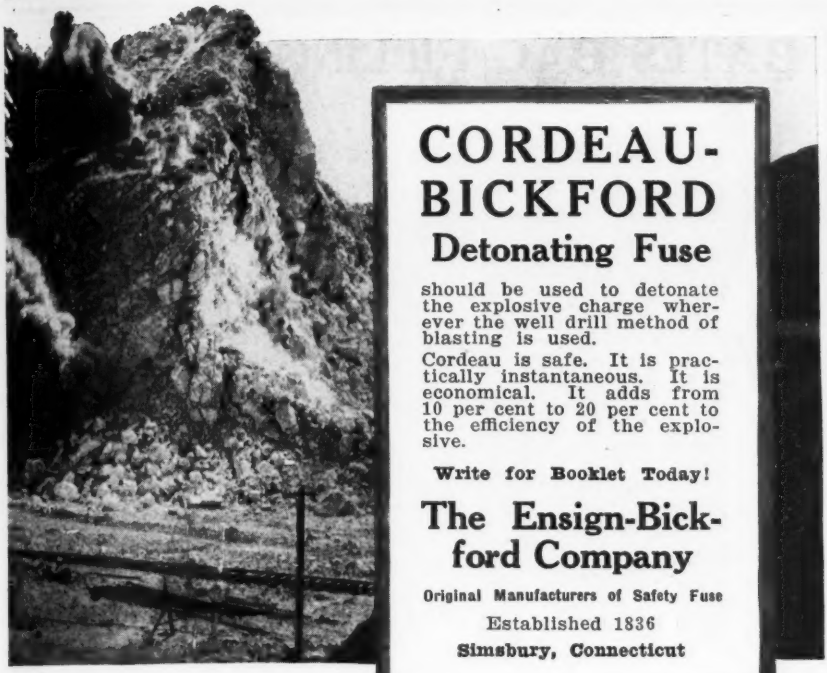
EAGLE "MIKADO" **PENCIL No. 174**

Regular Length, 7 inches

For Sale at your Dealer Made in five grades

Conceded to be the Finest Pencil made for general use

EAGLE PENCIL COMPANY, NEW YORK



CORDEAU-BICKFORD

Detonating Fuse

should be used to detonate the explosive charge wherever the well drill method of blasting is used.

Cordeau is safe. It is practically instantaneous. It is economical. It adds from 10 per cent to 20 per cent to the efficiency of the explosive.

Write for Booklet Today!

The Ensign-Bickford Company

Original Manufacturers of Safety Fuse

Established 1836

Simsbury, Connecticut

The Ideal Bucket for Cableway Excavation

The PIONEER Back-Dump Bucket digs faster, dumps quicker, and uses less power. Built sturdily for long service. Write for catalog and full details.

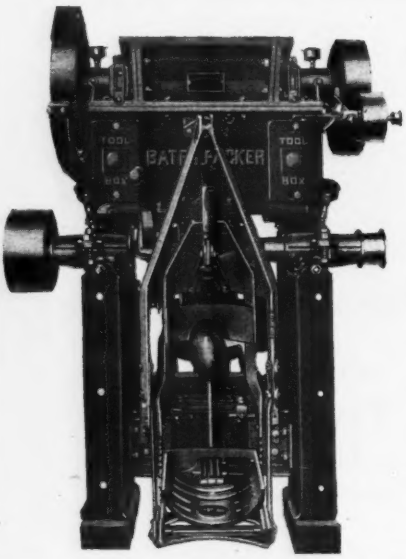
PIONEER BACK-DUMP BUCKET

Made By

The Mansfield Engineering Co.

Fletcher Savings & Trust Bldg.
INDIANAPOLIS, IND.

BATES BAG FILLING MACHINE



Less Labor
Greater Output
Reduced Cost

Used universally for packing pulverized rock products.

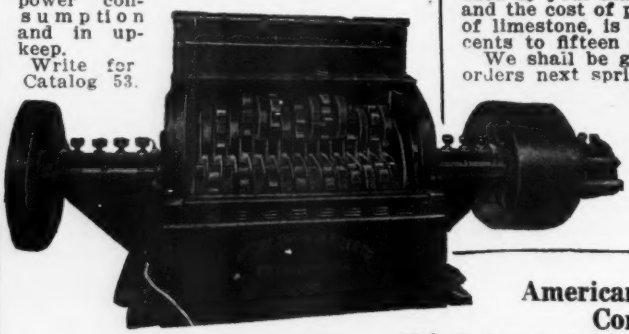
Bates Valve Bag Company
7310 South Chicago Ave.
Chicago, Ill.

They produced Limestone at 10 to 15 Cents a Ton and

Then They Bought THREE MORE

American Ring Pulverizers

There is a demand for limestone and furnishing this product can prove an added source of profit in quarrying. Our pulverizer with its rolling ring action is highly efficient, and low in power consumption and in upkeep.
Write for Catalog 53.



Here's What They Say:

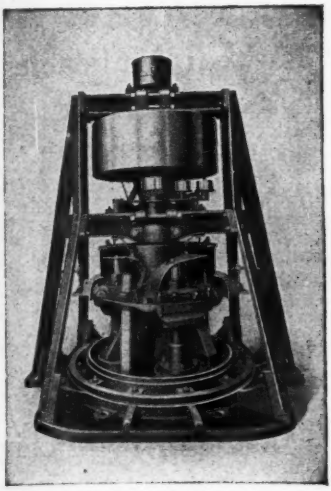
Gentlemen:—

After investigating different pulverizer constructions, we were advised by good authorities to purchase one of the American Pulverizers, especially suited for grinding limestone. Up to now we have ground over ten thousand (10,000) tons of limestone in the last three (3) months, with your machine No. 36 and we can say that the amount of power used by your machine, is very low and the cost of production per ton of limestone, is running from ten cents to fifteen cents per ton.

We shall be glad to double our orders next spring.

Yours very truly,
COLUMBIA QUARRY COMPANY,
C. P. Tigges,
Secretary.
St. Louis, Mo.

American Pulverizer Company
18th & Austin Sts., St. Louis, Mo.



The Perfect Agricultural Limestone Pulverizer

THE BRADLEY 3 ROLL MILL

Produces a very fine, uniformly-ground product at minimum cost. A mill built to meet the demands of the most exacting trade.

Produces a fine-ground product cheaper than most other machines when producing coarse materials.

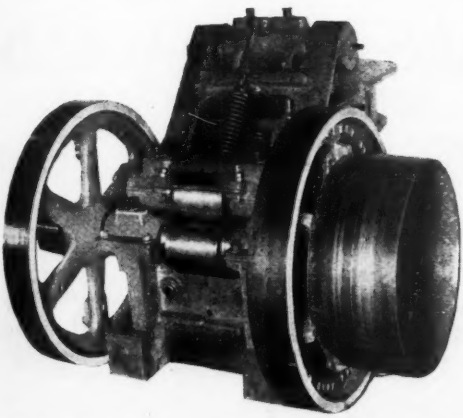
Finishes in Single Operation

We are prepared to furnish complete plans for agricultural limestone plants.

Catalog 42 Upon Request

BRADLEY PULVERIZER CO.

BOSTON LONDON Works: ALLENTOWN, PA.



RELIANCE

The Crusher with the Longer Life.

All **RELIANCE** Equipment is built to meet the hardest conditions and to operate at an extremely low maintenance cost.

We manufacture a complete line of

QUARRY AND ROAD-BUILDING EQUIPMENT

WRITE US FOR CATALOGUE AND PRICES

Prompt Deliveries

Universal Road Machinery Co.

Kingston, N. Y.

Canadian Representatives F. H. HOPKINS & CO., Montreal and Toronto

Howe

Charcoal Malleable Iron Elevator Buckets

Our large stocks are being drawn upon heavily by manufacturers and users. Order immediately for early delivery. All sizes and styles, "Manufacturers' Standard." The greater strength of Charcoal Malleable Iron buckets and their ability to resist corrosion, rust and wear are well known to all users.

Howe **Straight-Line** Malleable Detachable Chains, Howe **Double-locked** Combination chains, Roller, Pintle and Ley Bushed chains for elevating, conveying and power transmission.

Howe Chain Company, Muskegon, Michigan

Howe Chains-Buckets

"HERCULES SOLID WELD"

STEAM SHOVEL CHAIN

The Chain That Puts the Shove in Steam Shovels

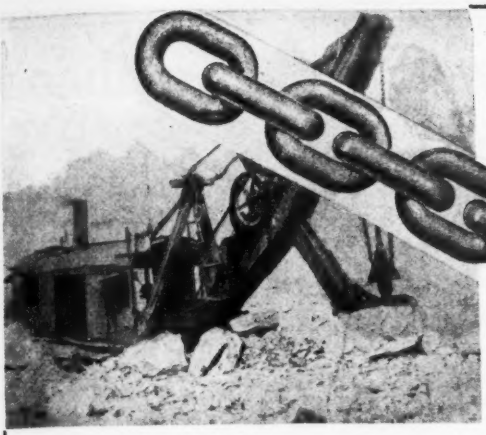
In use for many years. Will not open at weld or go to pieces before it actually wears out.

Manufactured only by:

The Columbus McKinnon Chain Co.

Columbus, Ohio

Canadian Factory:
THE McKINNON COLUMBUS CHAIN, LTD.,
ST. CATHARINES, ONT.



If You Will Link Your Steam Shovel Operation to the Quality in

TAYLOR MESABA CHAIN

you will have uninterrupted, satisfactory service covering a long period of time. There's 47 years' manufacturing experience back of our claim.

TAYLOR MESABA CHAIN is hand forged from selected, carefully tested high iron. It has short links, properly welded and possesses strength and endurance.

Sizes carried in stock for immediate shipment; ⅞", 1", 1⅛", 1¼", 1⅜", 1½", 1⅝".

Descriptive circular on request.

S. G. TAYLOR CHAIN COMPANY

138 S. Dearborn St. Chicago, Ill.

Avoid Repairs and Breakdowns

You can do it with Adamite.

Adamite is an alloy that is giving wonderful service in the best mills and quarries.

It is extremely hard, durable and tough and gives greatly increased service on crusher faces, sand mill rolls and other parts subjected to excessive abrasion, wear and shock.

You can greatly reduce repair costs and avoid breakdowns by using

ADAMITE

Let us tell you how!

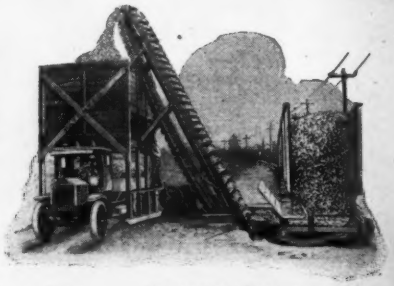
PITTSBURGH IRON & STEEL FOUNDRIES CO.

Executive Offices, Pittsburgh, Pa. Foundries, Midland, Pa.

Here's What We GUARANTEE

When equipped with proper size feeder, the SUNBURY Automatic Unloader

Will load or unload a 50-ton car in 90 minutes!



The **SUNBURY Automatic Unloader**

And one man can handle it. The first cost is reasonable and its return from the standpoint of its being able to substantially increase your profits makes it a very profitable investment.

Its automatic feature is important and will commend it to you. It is simple in construction, strongly built and economical in operation.

We will be pleased to send you an illustrated descriptive circular.

THE SUNBURY MANUFACTURING CO.

SUNBURY, OHIO

THE SCOOP CONVEYOR

SAVES 6 TO 12 MEN

Storing and Reclaiming—Loading and Unloading All Kinds of Material

OVER 2,000 USERS

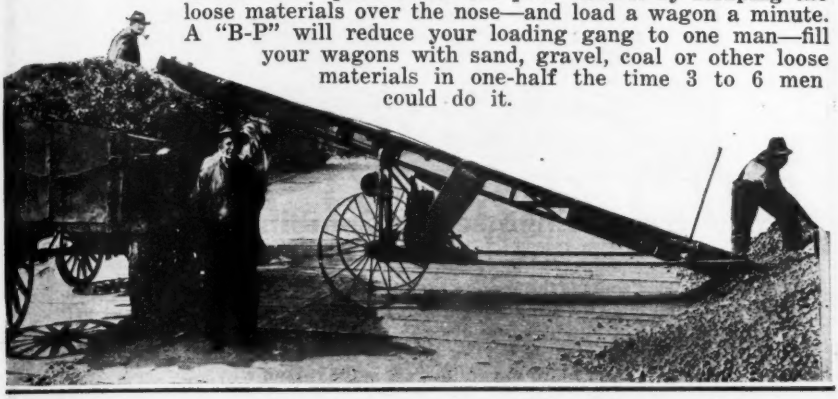
Write for Catalogue No. 102

PORTABLE MACHINERY CO., Passaic, N.J.

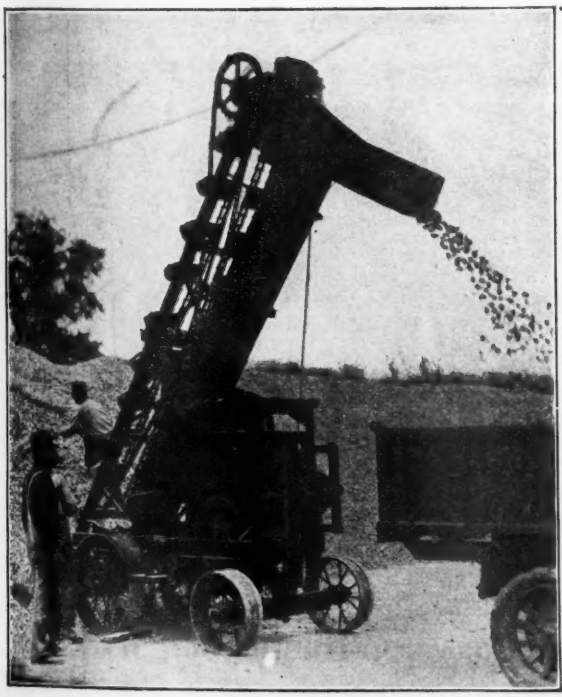
Loading—"A Wagon a Minute"

Write for Bulletin E-204. No obligation.

You can load your wagons at the rate of "A Ton a Minute" with a "Brown-Portable" Belt Conveyor.
No shoveling required! One man can keep the shovel-end of the "B-P" pushed into the pile—feed it by **scraping** the loose materials over the nose—and load a wagon a minute. A "B-P" will reduce your loading gang to one man—fill your wagons with sand, gravel, coal or other loose materials in one-half the time 3 to 6 men could do it.



Brown Portable Conveying Machinery Co.
10 S. La Salle St., Chicago **30 Church St., New York City**



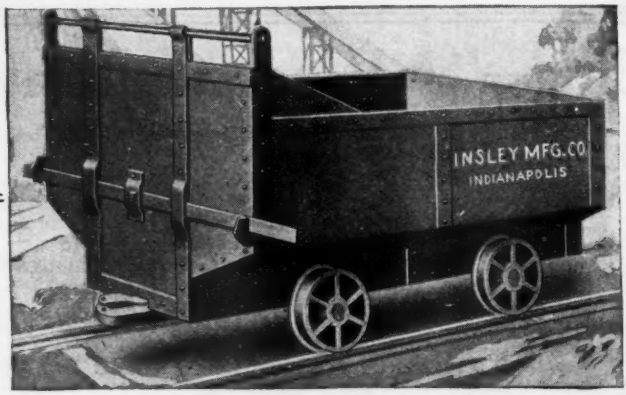
ATLAS
Self-Propelling
LOADERS

Loading the Atlas Way, spells economy and efficiency in handling sand, crushed stone or gravel.

Let an Atlas Loader be one of the means to help solve your labor problems. Loaders built for handling coal and other loose material.

Write us what your wants are and let us tell you how you can handle your material cheaper and better. Write for Atlas Loader Catalogue.

Atlas Engineering Co
Home Office and Factory
3009-21 Lisbon Ave.
Milwaukee, Wis.



55

Sound Engineering Combined with Sturdy Construction

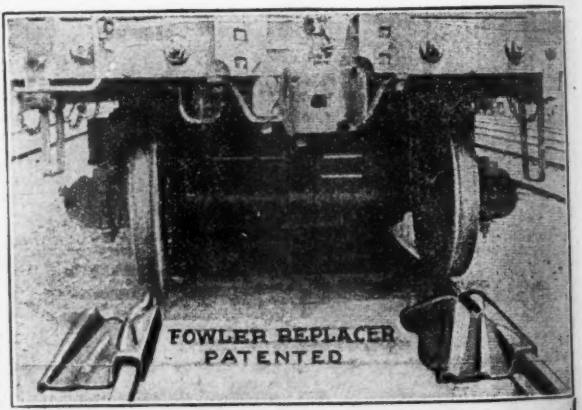
makes Insley Products the predominating Equipment in the industrial field. By understanding and visualizing in advance the work a product must perform, the average conditions under which it must perform it, and how fast it must be able to handle the work if properly manned, and then building these things into the equipment is the reason why.

You will be interested in the proposition we can offer you on cars, track, switches and turntables.

INSLEY MANUFACTURING CO., INDIANAPOLIS, IND.

They're Pretty Nearly Worth Their Weight in Gold—

when a derailment occurs and things are tied up.



FOWLER CAR REPLACERS

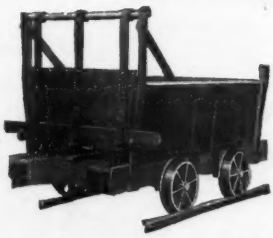
Fabricated of flange pressed steel, reinforced

Have tremendous sustaining power, yet are reasonably light in weight. Enable the replacing of a heavily loaded car or engine in a few minutes. Can be handled by one man. Their cost is trifling compared to their usefulness, even as insurance if nothing else. Built in two sizes.

Write for detailed description and prices

Track Equipment Co., Huntington, W. Va.

KOPPEL



KOPPEL QUARRY CARS

Always dependable—an ever serviceable car
that gives maximum service and long life.

Complete catalogue on request

KOPPEL INDUSTRIAL CAR & EQUIPMENT CO.
KOPPEL, PENNA.

SALES OFFICES:

CHICAGO, 808 Peoples Gas Bldg. NEW YORK, 30 Church St., Room 512
PITTSBURGH, Farmers Bank Bldg., Rooms, 1203-4-5-6 SAN FRANCISCO, Koppel Sales Co., Rialto Bldg.
PHILADELPHIA, 1420 Chestnut St.

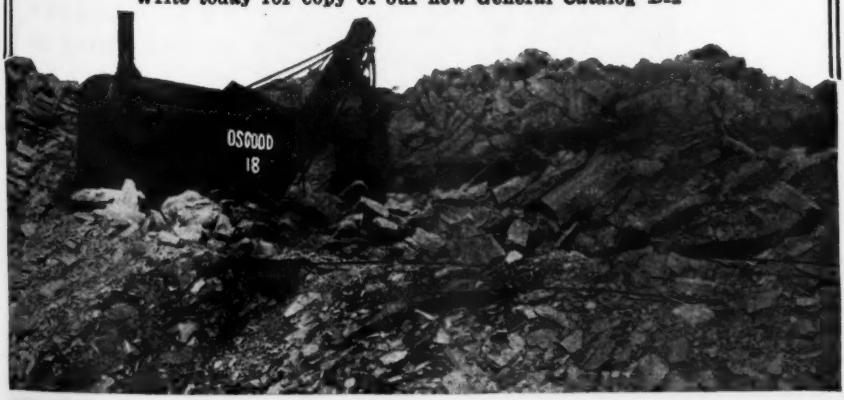
OSGOOD 18 ¾ yd. Traction Revolving Steam Shovel

is a splendid investment and one that has earned substantial profits for many companies operating Stone Quarries, Sand and Gravel Pits, etc. Its wide range of action and high dump make it especially popular.

THE OSGOOD COMPANY

MARION, OHIO

Write today for copy of our new General Catalog D-2



A VALUABLE FEATURE

of the

BYERS AUTO CRANE

is its

CATERPILLAR TRACTION

which enables its use "most anywhere" practical. This machine is equipped, as desired, with either road wheels or rail truck mounting.

The "BYERS" is rendering satisfactory service in material handling, stripping, car unloading, excavating, derrick-work, etc.

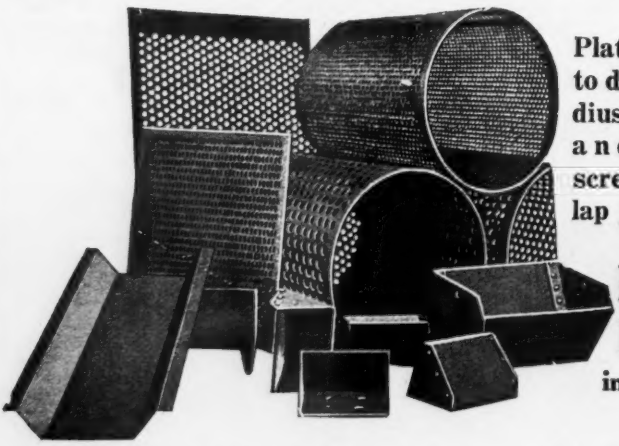
We shall be pleased to send you a descriptive booklet on request.

THE JOHN F. BYERS MACHINE CO.

430 SYCAMORE STREET RAVENNA, OHIO

Perforated Metal Screens

FOR STONE, SAND, GRAVEL, ETC.



Plates flat; rolled to diameter or radius for revolving and conical screens butted or lap joints.

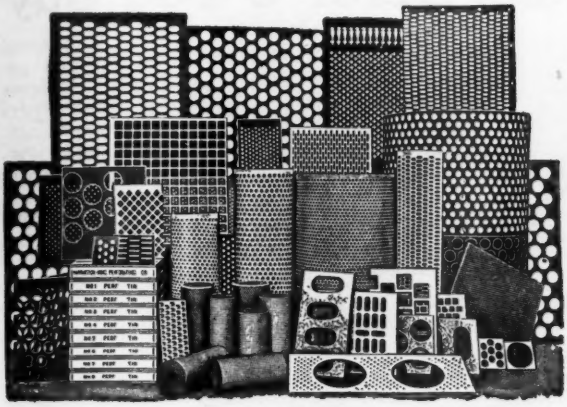
Elevator Buckets

in all styles and sizes

HENDRICK MFG. CO., 39 Dundaff Street CARBONDALE, PA.

Perforated Steel Screens

of Every Description



For STONE, GRAVEL, SAND, CEMENT And All MINERALS

The Harrington & King Perforating Co.

638 N. Union Avenue
CHICAGO

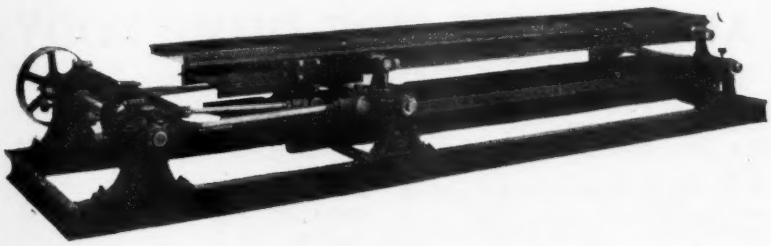
114 Liberty Street
NEW YORK

THE BALANCED ACTION SHAKER SCREEN

THAT SHAKES

WITHOUT VIBRATION

Works as quietly and as smoothly as a steam engine. No bumps, no jars, no grinding annoyance. Just a steady all-day, all-service machine built for one purpose—to separate mineral aggregates cheaply, thoroughly, with little power and less upkeep. Note that patented Rocker Arm? See how it makes the backward travel of one frame assist the forward travel of the other? It "cushions" the sudden stopping of one frame by the starting action of the other. Simple? Yes, and it does the work—quietly, quickly and efficiently. And it stands up under conditions that have scrapped many other types. A right design combined with proper construction securing the durability of structural steel, grey iron, bronze and babbitt. Write for catalog.



COYLE & ROTH MINNEAPOLIS MINNESOTA

Know Heil Dump Bodies and Hoists Befor e You Buy

The improved design and superior features of this Hydro Dumping equipment make it invaluable for producers. You can buy it from your dealer, or the Truck Manufacturer will install it at your order.

Write us for Circular 112, *today.*

THE HEIL CO.

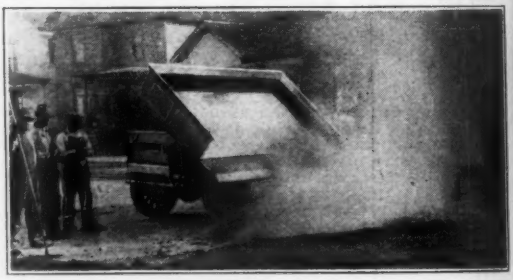
Offices 1139 Montana Ave., Milwaukee, Wisconsin

Water Storage *Tanks for all purposes* *Gasoline Storage*

DEALERS

Get after the Side-Dump Body Business, and increase the output of Trucks.

with a



Side View

AUTOMATIC SIDE DUMP BODY

To increase the Sales of Trucks put on a Side Dump Body and watch your Business Grow.

Dumps in any weather.
No lost space back of driver's seat.
Can't break down and get out of order.
Will outwear any truck.
Dumps a 3-yard load in a minute and half.
Dumps all the load off without operating Truck.

Fits any Chassis.

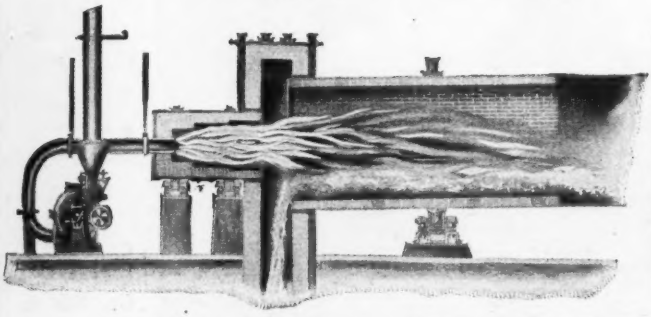
Write for attractive Dealers' Contract.

AUTOMATIC DUMP CAR COMPANY

1600 Ernsperger Street Sales Dept. A. SOUTH BEND, IND.

PULVERIZED COAL

for Drying and Calcining



CEMENT
LIME
GYPSUM
MAGNESITE
DOLOMITE
BAUXITE
PHOSPHATE ROCK
ETC.

THE AERO PULVERIZER

Burns coal like a gas, producing at will a wide range of temperature, a flame, the physical and chemical character of which is regulable—one that may be elongated or shortened, made oxidizing, reducing or neutral as occasion may require.

Write for Literature

AERO PULVERIZER COMPANY

1441 Equitable Bldg., **NEW YORK, N. Y.**

Weight
Life
Efficiency

For 20 years the Kingsford Sand Pumps have been acknowledged the standard. Made in all sizes.

KINGSFORD FOUNDRY AND MACHINE WORKS

Oswego, N. Y.

The Cheapest Labor will never take the place of the Haiss Self-Feeding wagon loader, after once installed — Reason: loads 5 Cu. Yds. in 5 minutes for 5 cents.

Haiss Self-Feeding Wagon Loaders

the type "digging," hand-propelled machine with the "crowding" device **is now equipped** with the patented self-feeding propellers. This loader cleans up a path wider than the full width of the machine. No shovellers needed for loading trucks.

THE GEO. HAISS MFG. CO., 142 St. & Rider Ave., N. Y. City.

Handling Crushed Stone, Gravel and Sand with G.-W. Loaders

THERE are a number of contributing reasons for the quick-loading ability of the G-W Wagon Loader.

FIRST—The frame is of light steel, though exceedingly strong and rigid, making it easy to move the machine about.

SECONDLY—The collapsible feature permits the machine to be lowered to clear obstructions such as are found in many yards. To raise or lower the machine, less than one minute is required.

THIRDLY—All mechanism is a model of simplicity, making for easy and rapid handling, and minimum upkeep.

By all means get our "Bulletin 40." It's full of data and pictures showing what G-W Wagon Loaders can do in the way of handling crushed rock, gravel, sand, etc.

Gifford-Wood Co.

HUDSON, N. Y.

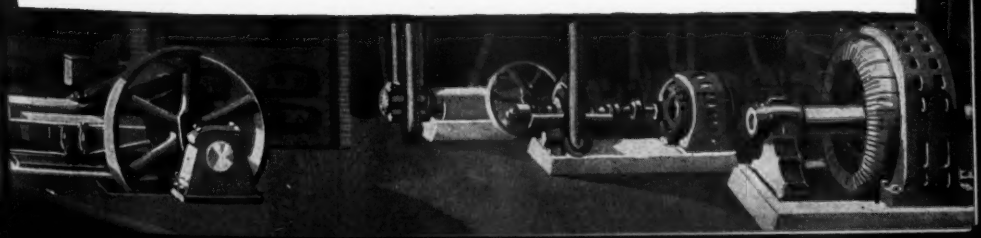
New York Boston Buffalo Chicago

Pit, Quarry and Mill POWER PLANTS

TO MANUFACTURERS of POWER PLANT EQUIPMENT and SUPPLIES:

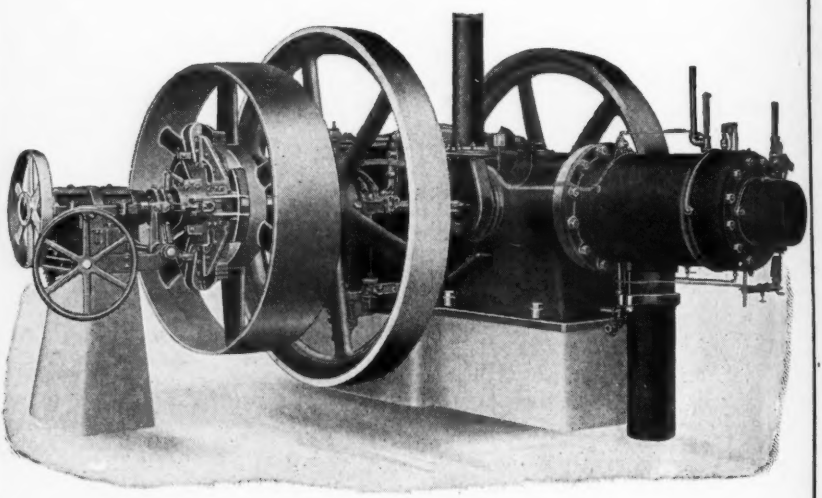
The sand and gravel, stone, cement, gypsum and lime industries, composing the field served by PIT and QUARRY, employ an aggregate of about two million horse power, and offer a large and ready market for all kinds of power and transmission machinery and supplies.

PIT and QUARRY, by its 100% complete circulation in this field, makes these industries entirely accessible to you at one expense. Advertising rates and A. B. C. circulation data upon request.



Your Plant Operated by a Muncie Oil Engine

Will pay greater dividends than any investment you could possibly make.



100 H. P. Special Heavy Duty Crude and Fuel Oil Engine

Operates successfully on cheapest grades of crude or fuel oils, as well as light distillates or kerosene, built in fifteen sizes, 10 to 125 H. P.

Write today for Catalogue No. 23.
Tell us your requirements and we will forward you interesting data on your particular plant.

Muncie Oil Engine Company

140 Pittsburgh Ave., Muncie, Indiana

Boiler and Furnace Testing

By RUFUS T. STROHM

(Continued from last issue)

Before starting a test make sure that there is no chance for water to leak into or out of the boiler. See that the blow-off is tight, that there is no drip from gage cocks, and that the feed-line connections are tight, so that all the water fed to the boiler will represent accurately the amount evaporated during the test.

If a meter is used instead of the three-barrel method, make absolutely sure that the meter is correct, as the accuracy of the test depends on the accuracy with which the water measurements are made. *After a meter is installed, test it to see that it operates correctly under the plant conditions.*

The water level in the boiler should be the same at the end of the test as at the beginning. As the time for stopping the test draws near, therefore, try to bring the conditions the same as at the start. Do not, however, run the feed pump rapidly in the last few minutes for the test in order to obtain the same water level. If there is a slight difference in level, calculate the weight of water it represents and make the necessary correction to the total weight of water fed.

Temperature of Feed Water

Every plant should have a thermometer on the feed line, so as to find the temperature of the feed water. Preferably, this thermometer should be of the recording type. If such a form of thermometer is used during the test, it is unnecessary to take the feed temperature at stated intervals, as the record will show the varying temperatures, and so the average feed temperature during the test can easily be found.

128650°—20——2

If there is no thermometer in the feed line, take the feed-water temperature by means of a thermometer hung in barrel 3 (figure 2) by a hook over the edge of the barrel. Read this thermometer every half hour during the test if the feed-water temperature is fairly uniform; but if it varies considerably, read the thermometer every 15 minutes. The object is to obtain the average feed-water temperature during the test period. Therefore, mark down the temperatures as read at the stated intervals. At the close of the test add the readings and divide their sum by the number of readings and you will have the average temperature of the feed water.

Steam Pressure

Every boiler is fitted with a steam gage by which the pressure is indicated. It is important that the pressure gage be accurate. What is wanted in a test is the average pressure of the steam in the boiler, therefore, observe the pressure at regular intervals, just as with the feed-water temperature, and mark down these gage readings. The sum of the readings divided by the number of readings taken will be the average steam pressure during the test.

A recording steam gage is best and it makes its own readings.

Working Up the Test

After the boiler test has been made so as to find the weight of coal burned, weight of feed water used, feed-water temperature and steam pressure, the efficiency, the horsepower, and the economy must be obtained by calculation from the test results. The process of figuring the desired results from the test data is called "working up the test."

To illustrate the method used in finding the efficiency, etc., suppose that the data obtained from the test are as follows:

Length of test.....hours	10
Total weight of coal fired....lbs.	5,000
Total weight of water evaporated .....lbs.	35,000
Average temperature of feed water .....°F	180
Average steam pressure, gage .....lbs. per sq. in.	100

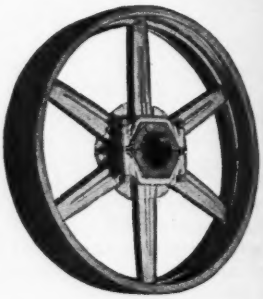
The efficiency of any process is always a comparison, or ratio, of the output to the input. In the case of a steam boiler the efficiency is the percentage of the heat supplied in the coal that is usefully employed in making steam. The output of the steam boiler is the heat represented by the quantity of water evaporated by a pound of coal, taking into account the feed temperature and the steam pressure, and input is the amount of heat contained in

THE BEST BELT

THE DICKBELT

FOR ALL PURPOSES

THE BEST PULLEY



BARRY STEEL SPLIT

WRITE US FOR OUR NEW CATALOGUE

R. & J. DICK COMPANY, INC.

BRANCHES IN UNITED STATES OF AMERICA

New York, 55 Barclay Street
Chicago, 63 West Lake Street
Philadelphia, 136 North 7th Street
Newark, N. J., 320 Market Street
Atlanta, 62 So. Forsyth Street
Kansas City, Mo., 1512 Main Street
Cleveland, 111 St. Clair Avenue
Seattle, Maritime Building
New Orleans, 415 Gravier Street

Branch Stores and Agencies in all Principal Cities of the World

—THE ALLY—

Conveyor and Transmission Belting

Highest grade stitched fabric belt on the market

Let us figure on your requirements

Manufactured by

THE ALLIED BELTING CO.

GREENVILLE, OHIO

a pound of the coal used. The efficiency of the boiler is the output divided by the input.

The heat contained in a pound of coal is called the "calorific value" or "heating value" of the coal. It can be found by taking a fair average sample of the coal used during the test, as explained in connection with weighing the coal, and sending the sample to a chemist, who will make a calorimeter test to determine its heating value.

At the end of the test the sample fuel should be spread out on a clean floor and all lumps broken up, so that no pieces are larger than 2 inches mixiumum diameter. Then the gross sample should be very thoroughly mixed by shoveling, after which it should be spread out in the form of a square of uniform depth and quartered down until a final average sample is obtained for shipment to a competent chemist experienced in fuel analysis.

About 2 quarts of the chemist's sample should be put in air-tight tins or jars for the determination of moisture; the balance of the sample (the total weight of which should be from 10 to 50 pounds, depending on the total weight of coal used in the test) may be packed in a wooden box lined with paper to prevent splinters from mingling with the sample. A duplicate coal sample should be kept at the plant to be used in case of loss of the sample sent to the chemist.

The Bureau of Mines has published bulletins or pamphlets giving the analyses and heating values of the various kinds and grades of coal from all parts of the United States. These bulletins can be used to learn the approximate heating value of the coal. Simply find out what district the coal used in the test came from and its grade, and then refer to the bulletin to obtain the heating value of the coal. If a chemist can be obtained to make a heat test, however, it is better to use the heating value he determines.

Suppose that during the test the coal used was run-of-mine bituminous having a heating value of 13,500 B. t. u. Every pound of coal fired, then, carried into the furnace 13,500 heat units, and this value therefore is the *input* to be used in calculating the boiler efficiency.

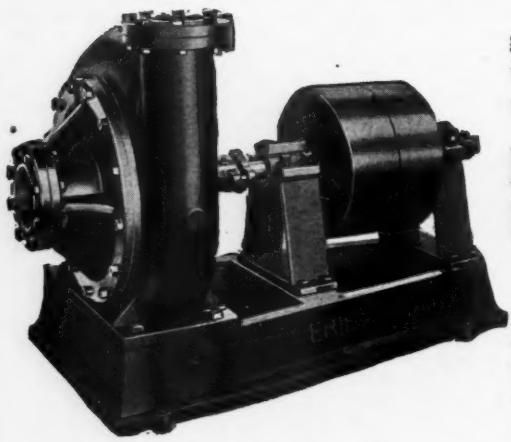
During the test 5,000 pounds of coal was fired and 35,000 pounds of water was fed and evaporated. This means that $35{,}000 \div 5{,}000 = 7$ pounds of water was evaporated per pound of coal burned. This is the "actual evaporation," and the heat required to evaporate this seven pounds of water is the output to be used in calculating the efficiency.

Every fireman knows that it takes more coal, and therefore more heat, to make steam with cold feed water than with hot feed water; also, that it is somewhat easier to make steam at a low pressure that at a high pressure. So it is plain that the heat required to evaporate 7 pounds of water into steam depends on two things, namely, (1) the temperature of the feed water and (2) the pressure of the steam in the boiler. From the data of the test, both the average feed-water temperature and the average steam pressure are known, and so it is a simple matter to find out the amount of heat needed to evaporate 7 pounds of water from the average temperature to steam at the average pressure.

A pound of water at 212° F. must have 970.4 B. t. u. added to it to become a pound of steam at 212° F., or zero gage pressure. This value, 970.4 B. t. u., is called the latent heat of steam at atmospheric pressure, or the heat "from and at 212° F." It is the heat required to change a pound of water *from* 212° F. to steam *at* 212° F. and is used by engineers as a standard by which to compare the evaporation of different boilers.

In a boiler test the temperature of the feed water is usually something less than 212° F., and the steam pressure is commonly higher than zero, gage. In the test outlined previously, the feed-water temperature was 180° F. and the pressure was 100 pounds per square inch, gage. It must be clear, then, that the amount of heat required to change a pound of water at 180° to steam at 100 pounds gage pressure is not the same as to make a pound of steam from and at 212° F.

To make allowance for the differences in temperature and pressure, the actual evaporation must be multiplied by a number called the "factor of evaporation." The factor of evaporation has a certain value corresponding to every feed-water temperature and boiler pressure, and the values of this factor are presented in the table on page 17. Along the top of the table are given the gage pressures of the steam. In the columns at the sides of the table are given the feed-water temperatures. To find the factor of evapo-



For handling sand, gravel, and other solids in suspension at a minimum cost, use

Erie Sand-Gravel Dredging Pumps

Small sizes as well as largest ones are designed to give maximum output and greatest wear for a given weight.

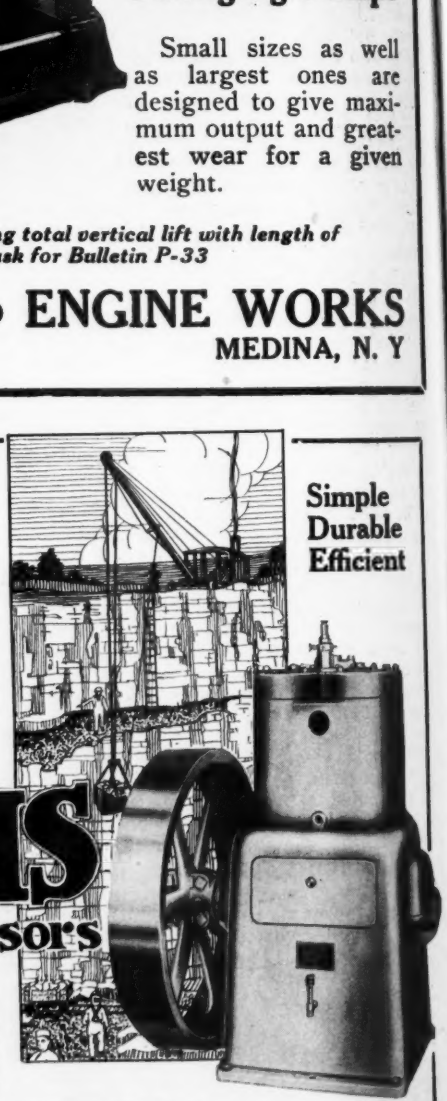
Tell us your conditions, giving total vertical lift with length of pipe line, and ask for Bulletin P-33

ERIE PUMP AND ENGINE WORKS

Formerly of ERIE, PA. MEDINA, N. Y

OPERATE WITH LESS POWER

Curtis Air Compressors require less power to operate, because of correct design, good materials used, conscientious construction, and the embodiment of our long experience in manufacturing machinery of this character.



Simple Durable Efficient

CURTIS Air Compressors

Are especially adapted to Pit and Quarry uses. Have self-regulating splash system for cylinder oiling. Can be furnished with automatic unloader if desired. 80% more cooling surface than any double-acting compressors of same capacity. Fully enclosed—dirt and dust proof. Write for illustrated bulletin describing our various models.

CURTIS PNEUMATIC MACHINERY CO.

1628 Kienlen Ave., St. Louis, Mo. Branch Office: 531-K Hudson Terminal, New York City.

ration for a given set of conditions, locate the gage pressure at the top of the table and follow down that column to the horizontal line on which the feed-water temperature is located. The value in this column and on the horizontal line thus found is the factor of evaporation required. If the feed water has a temperature greater than 212° F., obtain the proper factor of evaporation from the Marks and Davis steam tables.

Take the data of the test, for example. The average steam pressure is 100 pounds, gage. The average feed-water temperature is 180° F. So, in the table locate the column headed 100 and follow down this column to the line having 180 at the ends, and the value where the column and the line cross is 1.0727, which is the factor of evaporation for a feed-water temperature of 180° F. and a steam pressure of 100 pounds, gage.

This factor, 1.0727, indicates that to change a pound of water at 180° F. to steam at 100 pounds requires 1.0727 times as much heat as to change a pound of water at 212° F. to steam at atmospheric pressure. In other words, the heat used in producing an actual evaporation of 7 pounds under the test conditions would have evaporated $7 \times 1.0727 = 7.5$ pounds from and at 212° F. Hence, 7.5 pounds is called the "equivalent evaporation from and at 212° F." per pound of coal used.

As already stated it takes 970.4 B. t. u. to make a pound of steam from and at 212° F. Then, to make 7.5 pounds there would be required $7.5 \times 970.4 = 7{,}278$ B. t. u. This is the amount of heat required to change 7.5 pounds of water at 212° F. to steam at zero gage pressure, but it is also the heat required to change 7 pounds of water at 180° F. to steam at 100 pounds gage pressure, because 7.5 pounds from and at 212° F. is equivalent to 7 pounds from 180° F. to steam at 100 pounds. Therefore, the 7,278 B. t. u. is the amount of heat usefully employed in making steam per pound of coal fired, and so it is the *output*. Accordingly, the efficiency of the boiler is—

$$\text{Efficiency} = \frac{\text{Output}}{\text{Input}} = \frac{7{,}278}{13{,}500} = 0.54, \text{ nearly.}$$

In other words, the efficiency of the boiler is 0.54, or 54 per cent, which means that only a little more than half of the heat in the coal is usefully employed in making steam.

The chart in figure 3 is given to save the work of figuring the efficiency. If the equivalent evaporation per pound of coal is calculated and the heating value of the coal is known, the boiler efficiency may be found directly from the chart. At the left-hand side locate the point corresponding to the equivalent evaporation and at the bottom locate the point corresponding to the heating value of the coal. Follow the horizontal and vertical lines from these two points until they cross, and note the diagonal line that is nearest to the crossing point. The figures marked on the diagonal line indicate the boiler efficiency.

Take the case just worked out, for example. The equivalent evaporation is 7.5 pounds and the heating value of the fuel is 13,500 B. t. u. At the left of the chart locate the point 7.5 midway between 7 and 8 and at the bottom locate the point 13,500 midway between 13,000 and 14,000. Then follow the horizontal and vertical lines from these two points until they cross, as indicated by the dotted lines. The crossing point lies on the diagonal corresponding to 54, and so the efficiency is 54 per cent.

Boiler Horsepower or Capacity

The capacity of a boiler is usually stated in boiler horsepower. A boiler horsepower means the evaporation of 34.5 pounds of water per hour from and at 212° F. Therefore, to find the boiler horsepower developed during a test, calculate the evaporation from and at 212° F. per hour and divide it by 34.5.

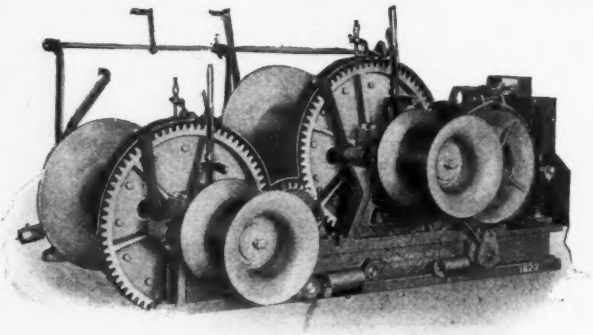
Take the test previously mentioned, for example. The evaporation from and at 212° F. or the equivalent evaporation, was 7.5 pounds of water per pound of coal. The weight of coal burned per hour was $5{,}000 \div 10 = 500$ pounds. Then the equivalent evaporation was $7.5 \times 500 = 3{,}750$ pounds per hour. According to the fore-going definition of a boiler horsepower, then—

$$\text{Boiler horsepower} = \frac{3{,}750}{34.5} = 109.$$

The "rated horsepower" of a boiler, or the "builders' rating," is the number of square feet of heating surface in the boiler divided by a number. In the case of stationary boilers this number is 10 or 12, but 10 is very commonly taken as the amount of heating surface per horsepower.

LIDGERWOOD HOISTS

Steam — Electric — Gasolene



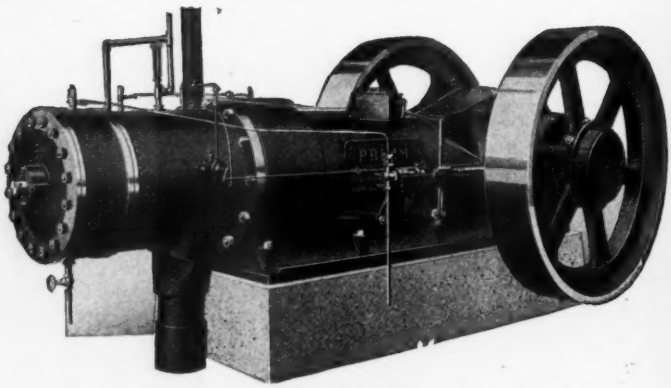
Tell us what you wish in the hoist line. We build types to meet every need in hoisting service. Send for Catalogs.

Our Engineers will consult with you at any time.

Lidgerwood Mfg. Co.

96 Liberty Street New York

"PRIMM" OIL ENGINES



This engine can be used for either right or left hand drive.
This engine is of two cycle type and runs as steady as a steam engine, and operates on fuel oil, the cheapest fuel obtainable.
This engine has no valves to fail to seat.
This engine has no open fires while operating.
This engine has no gears or electrical ignition system.

A SIZE AND TYPE FOR EVERY NEED ILLUSTRATED IN OUR CATALOG

THE POWER MFG. CO. 913 Cheney Ave. MARION, OHIO.

BUCKEYE BOILER SKIMMER

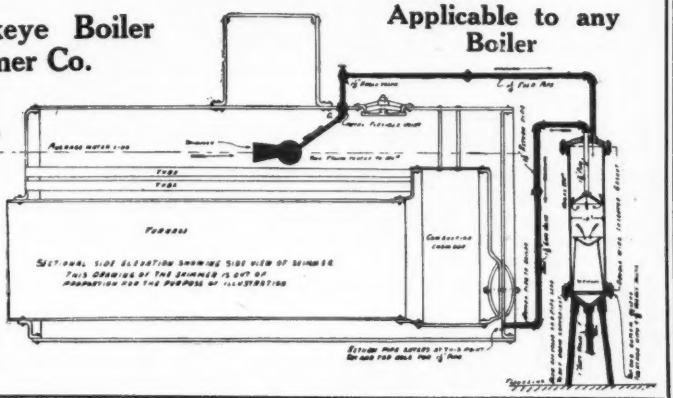
floats on the water level removes all impurities as they rise to the surface during generation of steam. Prevents scale formation and the accumulation of mud which are so detrimental to the life of the boiler. Ends blow-off valve trouble. Reduces fuel bills. Works automatically. Costs nothing to operate.

Install One in Your Own Boiler for 30 days' FREE Trial

The Buckeye Boiler Skimmer Co.
Waterworks Drive, Toledo, Ohio

Eastern Representative—W. F. Cremean, 316 Miners Bank Bldg., Wilkes-Barre, Pa.
Western Representative — C. J. Holland, 730 Peoples Gas Bldg., Chicago, Ill.

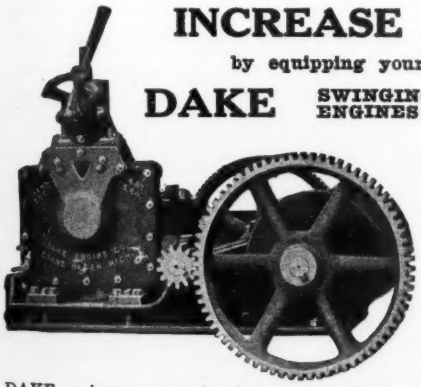
Applicable to any Boiler



INCREASE PRODUCTION

by equipping your bull-wheel derricks with

DAKE SWINGING ENGINES

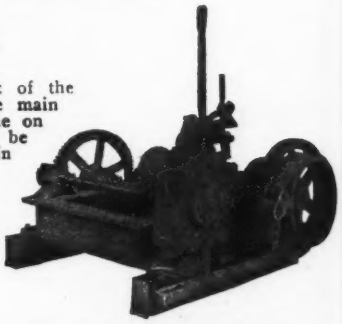


For every DAKE Swinger you install, you have a faster, more efficient derrick, which saves you time and labor.

Engines have no dead centers, but start, stop, and reverse instantly.

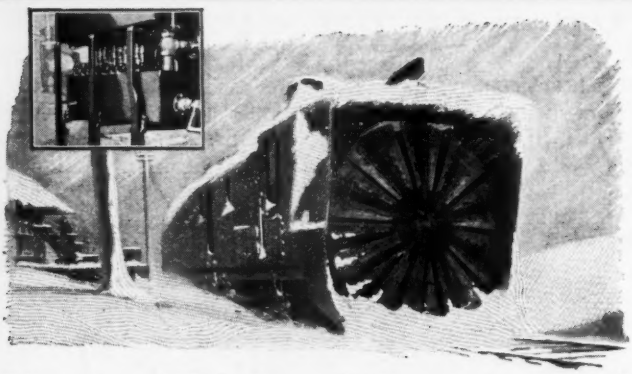
DAKE swingers may be bolted directly in front of the hoisting engine, with plenty of clearance for the main hoisting lines. They are furnished with the engine on either right or left hand side, so that they may be installed on either side of the hoist, and be within direct and immediate control of the engineer.

Send for catalog and full particulars.



Dake Engine Co., Grand Haven, Mich.

New York: H. L. Drullard, 30 Church St.
Chicago: J. E. Chisholm & Co., Ltd.
741 Monadnock Block



To the left is shown a snow plow—equipped with McCord Class BA Lubricator — operated on the Copper River and Northwestern Railway of Alaska. The lubricator has given excellent satisfaction according to Charles Dustin, master mechanic.

Clearing Tracks of Snow in the Arctic Circle

Because it is built to withstand the heaviest, roughest wear and delivers oil exactly as needed—regardless of temperature—McCord Lubricators are giving never-faltering service in the far north as well as in the tropics—wherever positive, dependable lubrication is required.

Write your name and address on the margin of this page; mail to us and we will send you our catalog completely describing McCord Force-Feed Lubricators.

McCord Mfg. Co., Inc., Detroit, Mich., U. S. A.

Also Manufacturers of McKim Gaskets and McCord Automobile Radiators.

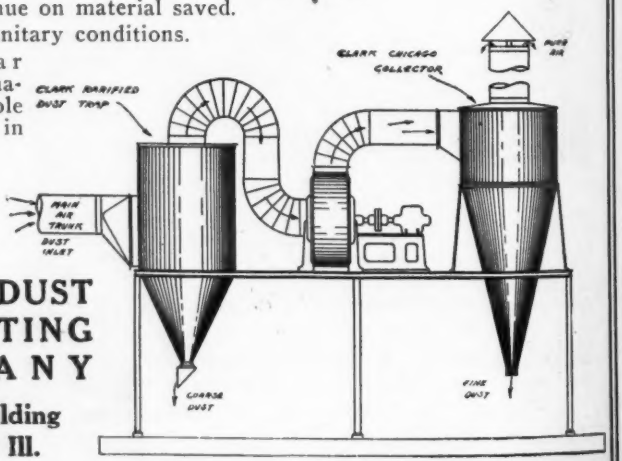
TYPE B-A **McCord FORCE FEED Lubricators**

Clark's All Metal Dust Collecting Equipment

for pulverized limestone and for eliminating dust in your plants

POINTS OF ADVANTAGE

1. Large revenue on material saved.
2. Improve sanitary conditions.
3. Saves wear and tear on machinery. Durable and reasonable in price.



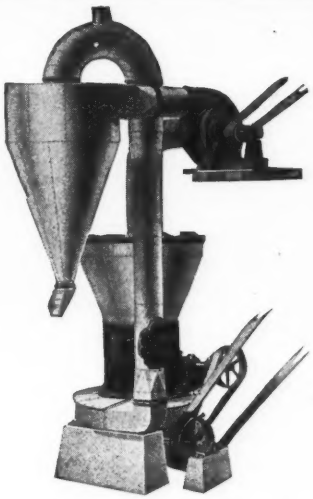
Write

CLARK DUST COLLECTING COMPANY

Fisher Building
Chicago, Ill.

What Percentage of Your Powdered Coal Falls Into Your Clinker Because It Is Not Fine Enough to Burn the Instant It is Introduced Into Your Kiln

?



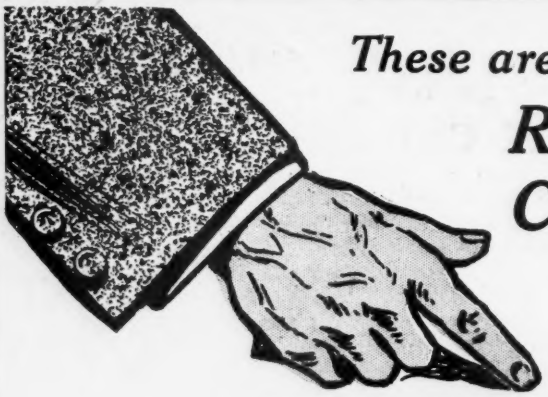
With ordinary pulverizers giving a fineness of 90 to 95% passing a 100 mesh the remaining 5 to 10% will contain a very high percentage of very coarse particles which do not burn readily.

With Raymond Mills using Air-Separation these large particles are entirely eliminated and very economical production can be obtained where the coal shows a fineness of 90 to 92% passing a 200 mesh and 99% or better passes the 100 mesh.

Raymond Roller Mills produce a powdered coal which will very materially increase the production of your kilns.

Raymond Bros. Impact Pulverizer Co.

1307 Branch St. Chicago, Ill.



These are

Rugged Characters

Watt Cars

—so are what they represent!

In a watch, you look for great delicacy and precision. In a car, you require ruggedness, staunchness, sturdiness—qualities of strength, substantiality, SERVICE. These **CHARACTERIZE** Watt Cars. And the **Precision** is there, too, in abundance—the precision or nicety of workmanship, machining, fit and assembling, and **our preciseness** that only these qualities shall enter into the construction of our products. With **you**, it is a matter of **decision**. We shall be pleased to serve you.

THE WATT MINING CAR WHEEL CO.

Barnesville, Ohio

Denver:
Lindroth, Shubart & Co.
Boston, Bldg.

San Francisco:
N. D. Phelps
Sheldon Bldg.

Philadelphia:
Edelen & Co.
235 Commercial Trust Bldg.